IMPULSE

JEROME J. LOHR COLLEGE OF ENGINEERING

SPRING 2021

Bruce Berdanier
Dean, Jerome J. Lohr College of Engineering

FEELINGS OF COMMUNITY, ACCOMPLISHMENT AND STUDENT SUCCESS ARE HERE

Dear friends of the Jerome J. Lohr College of Engineering:

The promises of spring's renewal along with hopes for a healthier environment and the return to activities and connections we have missed the past year seem tantalizingly close. We are doing everything we can to move purposefully and safely in a consistent, positive direction for everyone at our university and in our defined communities.

This issue of Impulse really brings home to me the community and support that I have received in the Lohr College of Engineering as we celebrate retirements, successes and a bright future being created by our students, faculty and supporters.

Kurt Bassett and Teresa Keys Hall announced their retirements for this spring after distinguished leadership careers in our college. They each received the Bailey Leadership award (2019 and 2020, respectively) for basically being the university's outstanding department head for that year. I remember how they were part of the team that invited me in as civil and environmental engineering department head in 2008, and then again they supported and encouraged me to return as dean in 2018. The people at SDSU are the best component of my job. I could not succeed without them.

I note, too, the retirement of exceptional faculty and staff like Sheila Ohlsen (who provided financial analysis support to me as a department head and dean), and Bill Bloxsom (an outstanding and recognized teacher in mechanical engineering).

Our college program assistant, Becky Pistulka, isn't retiring, but she is moving to university career services. She was beyond an expert of logistics, perhaps achieving "wizard" status. Many of you interacted with her in the alumni and industry engagement activities that she directed over the years. I'm glad she is staying at the university.

Please note the journeys of Adolph Fejfar (2020 distinguished engineer) and Tim Vanderham (from Kevin Moe undergraduate scholar to chief technology office at NCR Corporation and now endowing his own named scholarship).

I want you to note the remodeling details for the civil and environmental engineering and mechanical engineering departments are finally being completed in Crothers Engineering Hall. This has been more than a 10-year journey that was started when I was department head and was shepherded by Nadim Wehbe the past seven years. What a joy for me to return and be part of this work and to see the results that the financial support from all of you donors has accomplished.

Finally, as we look to the future and our next generation, our high-impact activities teams in robotics are already using about 2,500 square feet of space at the Research Park at SDSU. Their innovation and confidence in moving forward to develop new robotics addressing space research and development is laudable and exciting.

As a college, we need to develop about 10,000 new square feet to build an integrated, innovative ecosystem of students, professors, startups, companies, internships, teams and research. We will be working to raise about $3 million to support the building and equipping of this space during our comprehensive campaign. Come along with us and be part of this amazing engineering effort!

Bruce Berdanier

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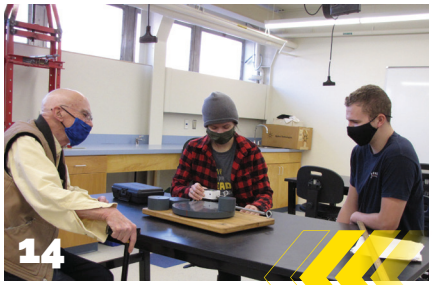
ABOUT THE COVER

TERESA KEYS HALL, head of the Department of Construction and Operations Management, and **KURT BASSETT**, head of the Department of Mechanical Engineering, leave the college this spring.

IMPULSE

SPRING 2021



FEATURES

TONKOSKI NAMED NEW HOHBACH PROFESSOR AT SDSU

Less than a decade into his career at SDSU, Reinaldo Tonkoski has been named the Harold C. Hohbach Endowed Professor in Electrical Engineering.

Tonkoski, an associate professor in the Department of Electrical Engineering and Computer Science in the Jerome J. Lohr College of Engineering, began teaching at State in 2012 after earning his doctorate in electrical engineering from Concordia University in Montreal late 2011. His bachelor's and master's degrees were earned in his native Brazil.

Tonkoski is the third person to receive the Hohbach Professorship, which was created in 2011 by the 1943 electrical engineering graduate.

Sid Suryanarayanan, head of the Department of Electrical Engineering and Computer Science, said selection as an endowed professor is significant because "receiving an endowment represents a high level of trust and expectation by the department and the college on the faculty. Dr. Tonkoski's impactful work in electric energy systems, an area of critical importance to the region and the nation, justifies this trust.

"I am excited to see Reinaldo realize his plans for success under this award."

FOLLOWS GALIPEAU, QIAO

Tonkoski said, "I am truly honored and humbled to receive this special award. I am also very thankful to be a faculty member in a university that believes in and supports our work." He noted the first recipient, Dave Galipeau, "has been a great mentor and influence in my professional career here at SDSU. Following in his steps is a great honor. This professorship will allow our research group and department to grow and produce high impact research as he did."

Galipeau, a professor in the photovoltaics program, received his medallion that accompanies the professorship at an investiture ceremony Nov. 10, 2011. He held the professorship until retiring Jan. 21, 2015, after 23 years at the university. Although now a professor emeritus, he continues to be active in the department mentoring Tonkoski.

The other Hohbach Professor was associate professor Qiquan Qiao, whose investiture ceremony was in October 2016. He held the honor until leaving in the summer for a position at Syracuse University.

Reinaldo Tonkoski, center, is honored as the Harold C. Hohbach Endowed Professor in the Department of Electrical Engineering and Computer Science at South Dakota State University. He is flanked by Bruce Berdanier, left, dean of the Jerome J. Lohr College of Engineering and Sid Suryanarayanan, department head.

AWARD TO BOOST RESEARCH EFFORT

The selection includes a $30,000 annual stipend for five years, and the award can be renewed.

Tonkoski said, "This award will allow me to implement a vision of impactful power engineering research, development and market-driven programs. This vision aims to directly impact technology transfer and economic development in the state. The idea is to position the department to act as an effective catalyst of small business in engineering.

"We will work within this framework to make it viable for someone to commercialize the research we do."

His research interests are renewable energy, microgrids, control systems, and power electronics and power systems. In addition to his research, Tonkoski also teaches upper-level and graduate classes in subjects such as power systems, photovoltaics and wind energy systems.

Tonkoski explains, "My research and teaching focus is on how to better integrate renewable energy sources into power systems, to make it cost-effective, sustainable and improve reliability of the systems so the power system doesn't fail. Voltage and frequency control are major challenges in this area and are the bread and butter of my research."

To date, he has received grants and contracts exceeding $1.6 million and trained more than 20 graduate students who are currently working in U.S. national laboratories or in the power industry.

MORE COMMERCIALIZATION ENVISIONED

Most recently, Tonkoski was involved with a $3 million, two-year collaborative award from the Department of Energy with SDSU's portion $593,000. The University of Alaska-Fairbanks is the lead institution on that award that seeks to develop and validate models to help utilities and power systems operators assess if the system is stable with large amount of renewable energy sources.

Funding runs through Aug. 14, 2021.

Tonkoski said the endowed professorship "opens doors to have other initiatives like this DOE grant as well as bringing in visiting scholars to support our work. It can help us seed research and collaborations with other researchers and help us reach out to other research labs, like Sandia National Laboratories that has been instrumental collaborating with our research group."

One of the goals Tonkoski cited in his Hohbach application was to spur economic development by giving graduate students the training needed to develop spinoff companies from their research. "I want to develop a pattern of students commercializing their research and facilitate internships with industry partners to develop this ecosystem. It's hard for people to invest in you if they don't know you.

"We have good relationships with national research labs, but we can work more closely with industry and tailor research projects that are better aligned with their needs."

Dean Bruce Berdanier said that's something he wants to see throughout the Lohr College of Engineering.

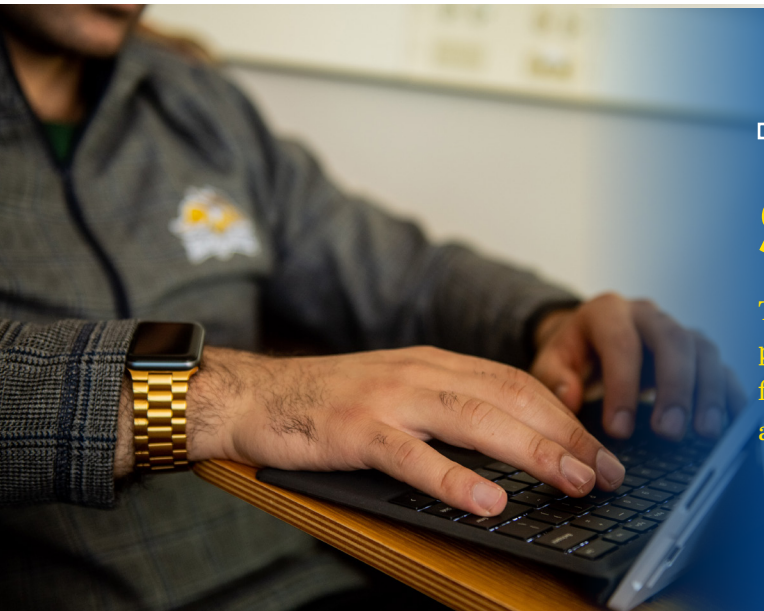
Berdanier added, "It has been a real personal and professional joy for me to know Reinaldo over the past 10 years and see him grow in expertise in his research and his purposeful development of professional relationships with the national laboratories. This is a very well-deserved honor for Reinaldo as he now moves toward becoming one of our senior professor-leaders in the Jerome J. Lohr College of Engineering."

RECORDING AVAILABLE OF INVESTITURE

His Hohbach investiture ceremony was April 8 before a small gathering. The ceremony was recorded for later viewing.

Reflecting on the honor, Tonkoski, who turned 40 this year, said, "I'm thrilled to be recognized this early in my career. And also extremely thankful to Mr. Harold C. Hohbach for having established this professorship. This is an exciting moment and a unique opportunity to inspire students to seek solutions for issues we face in the power industry of today and shape the future."

Dave Graves



TWO HOHBACH SCHOLARS

The Hohbach funds are now at the point in which a second professorship can be funded. The college has begun the process of filling that position in the Department of Electrical Engineering and Computer Science.

New Faculty

ZAC CHAPMAN didn't enroll in mechanical engineering with the thought of teaching the subject, but a little more than two years after receiving his bachelor's degree, the Otsego, Minnesota, native found himself on the faculty list.

Chapman, a May 2018 graduate, was hired as a temporary instructor in the fall to teach two sections each of measurement and instruction and thermal fluids lab, which are 300- and 400-level courses. For spring semester, Chapman is teaching the same courses but temporary has been stricken from his title.

In addition to teaching, Chapman also is pursuing a doctorate in mechanical engineering under assistant professor Jeffrey Doom.

Chapman also gained his master's degree in May 2020 while working under Doom. He was a graduate teaching assistant from January 2019 to May 2020 and the lab instructor for the mechanical engineering design technologies course, leading class examples on computer software modeling programs Solidworks and Matlab as well as Excel.

In the summer, department head Kurt Bassett asked him about filling a vacancy on a short-term basis, and it's "turned out really great," Chapman said.

"Teaching wasn't something I considered, but it is nice to try." One aspect he enjoys is showing how mathematical models and lab or field application differs and then identify why that happens. "That's something my dad (who works in machine prototyping) had driven into me. There is a difference between the computer world and the real world."

A young-looking 25, Chapman has some students older than him. But with his experience as a graduate assistant, the nerves associated with a new career weren't overwhelming, he said.

Learning to teach online was a challenge. He had scant experience there and needed to prepare lectures in an online format. Lab work remained in person, although participation was limited to two four-person groups at a time. He said it helped to have taken the courses fairly recently and to have access to documents on how the courses were taught.

Another thing Chapman wasn't prepared for was all the emails faculty receive, "especially at the end of the semester when students are trying to improve their grades."

Reflecting, Chapman said, "I'm enjoying academia. It's fun to get to know the students, and I have an opportunity to work on an interesting project that I wouldn't be working on if I wasn't in the doctoral program."

That project is computer modeling of combustion in scramjet engines used in supersonic flight. Maintaining combustion with supersonic flow creates engineering challenges. Therefore, Doom and Chapman are looking at cavities and other techniques to slow air flow.

Outside of Crothers Engineering Hall, Chapman enjoys water skiing, mountain biking, ice fishing and spending time at the family cabin near Alexandria, Minnesota.

SDSU RANKED 4TH-MOST AFFORDABLE IN COMPUTER SCIENCE

SDSU has been ranked fourth among the 30 most affordable residential bachelor's degrees in computer science for 2021 by Computer Science Degree Hub.

The 30 most affordable programs were selected and ranked in order of estimated program cost for out-of-state students.

Students in SDSU's Bachelor of Science in computer science program take hardware courses along with programming and software engineering courses. This helps them understand the interaction between hardware and software. The program ends with two capstone courses in which each student is placed on a team to build a significant software project.

FUNDS AWARDED

FOR HEAVY CONSTRUCTION POST AT SDSU

The Jerome J. Lohr College of Engineering is putting a heavy emphasis on its construction management program.

The heavy-highway construction minor, which has been in place for eight years, has obtained funding for a professor of practice in heavy construction. The plan is to have that new faculty member in front of the classroom by fall. Funding of $50,000 for the next five years comes from the Beavers Charitable Trust, which is the scholarship arm of Beavers Inc., a national heavy construction industry trade group.

The aim is to increase enrollment in the program and, in turn, increase the number of graduates entering heavy construction.

SDSU already is one of 46 United States universities with a Beavers-endowed scholarship in heavy construction.

The professorship represents a heavier commitment to the SDSU program, which becomes the 16th university with a Beavers-funded professorship. "If you get the right person in front of a classroom, they can be an evangelist for heavy construction," said Dave Woods, executive director of Beavers Inc. and Beavers Charitable Trust.

JOHNSON KEY TO GAINING GRANT

He cited the work of Gary Johnson, an adjunct faculty member who has been teaching heavy estimating at SDSU for nine years.

Johnson also is president of A-G-E Corp. in Fort Pierre, a family-owned heavy construction firm specializing in highway, railroad and marine projects for more than 50 years. Johnson also sits on the Beavers board of directors and was influential in securing the scholarship gift from the trust following a visit to Johnson's class by Woods.

"The one thing we find, if you don't have someone on the faculty dedicated to heavy construction, the scholarship effort doesn't get that traction," Woods said.

Johnson certainly fits that bill and by bringing in a full-time faculty member who also has extensive field experience, the program should gain even more traction. The memorandum of understanding for the professorship requires the successful applicant to have at least 10 years of experience as well as a bachelor's degree.

Universities typically require at least a master's degree to fill a permanent position.

However, Woods noted, "When Gary is teaching a class on heavy construction estimating, students are always interested in that. I think it really compliments a program when they do have people with plenty of real-world experience." The grant request states that the ideal candidate would be someone working in or recently retired from a managerial position.

Teresa Keys Hall, head of the SDSU construction and operations management department, said, "I envision when we add this new person, we will grow the number of minors and construction management students overall."

There are five faculty members in construction management, but there hasn't been a dedicated heavy construction instructor since Pat Pannell retired in 2014. Johnson said the new hire would be a good complement to Janet Merriman and Norma Chandler Nusz, who have strong field experience in closely affiliated construction areas.

SDSU COMMITS TO CREATING ENDOWMENT

In addition to the Beavers funding, the SDSU Foundation will be seeking matching funds in order to create a lifetime endowment for the post.

"We see the commitment (SDSU has) and that's important as a funding agency," Woods, of Los Altos, California, said.

The grant proposal states, "Based on early expressions of interest, we are confident the match can be secured. We are developing donors to match the funds provided by (Beavers Charitable Trust) with the intent to secure combined spendable funding of at least $100,000 annually." The university hopes to begin funding the endowment by year three.

Johnson has agreed to monitor the five-year grant on behalf of Beavers and if he can't complete the task, his sons, Andy and Gerad, both SDSU construction management grads, are to fulfill his obligation.

"This wouldn't have happened without him," Keys Hall said of Johnson.

GRADS FINDING JOBS IN MIDWEST

There are currently 15 students minoring in the heavy-highway construction program with that count annually varying from 10 to 20, Keys Hall said. "Of the students who complete the minor, three-quarters end up in the discipline. By and large, we're pretty successful in placing students with heavy construction companies," she said.

Students who want to work in the Midwest have been successful finding employment in the region and some land jobs with national firms, she said.

One of the roles of the new professor is to be a liaison to "our regional heavy industry partners. We enjoy solid working relationships with the South Dakota Association of General Contractors Heavy Highway Utilities chapter and the Minnesota Contractors Association," the grant proposal states.

"Expanding our reach into Iowa, Nebraska and North Dakota, states where we have also been successful in recruiting students, will open doors to internships and postgraduation placement for students in the region," the proposal added.

Dave Graves

Celebration of Excellence
HONORS KEYS HALL, GE

Two faculty members from the Lohr College of Engineering were honored at the March 25 Celebration of Faculty Excellence, livestreamed from the Oscar Larson Theatre on campus.

TERESA KEYS HALL

Keys Hall, retiring head of the Department of Construction and Operations Management, received the Harold and Barbara Bailey Excellence in Academic Department Leadership Award.

Keys Hall, who has headed the department since August 2003, retired April 21. She led a department of 280 majors in five programs, four minors and professional master's programs in operations management and engineering.

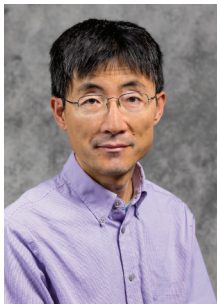
In addition, a new program in concrete industry management will begin in the fall.

The first female department head in the Lohr College of Engineering arrived at SDSU when Peggy Miller was president and Carol Peterson was vice president of academic affairs. She said she found it empowering to find other women in top university leadership and has been a mentor for others during her nearly two decades of service at State.

One of her major accomplishments was leading the effort to achieve ABET accreditation for the department's programs in 2016. The external reviewers called out the exemplary work the faculty had done in program assessment, engagement with stakeholders and retention of students at SDSU.

Just five years earlier, the department underwent a major reorganization following 2011 state budget cuts that eliminated its engineering technology programs. But electronics engineering technology was able to restart with funding from Daktronics and manufacturing evolved to become operations management. ABET accreditation was an affirmation of the collective will to succeed after a very difficult time for the department, Keys Hall noted.

In the past six months, the department has received major donations from the concrete and heavy construction industries for creation and expansion of those programs.



XIJIN GE

Xijin Ge, a professor in mathematics and statistics, was named the college's outstanding researcher.

Ge, who grew up in a small village in eastern China, obtained his bachelor's and master's degrees in physics from University of Science and Technology Beijing. He went to the University of Tokyo, for his doctorate, focusing on data mining using artificial neural networks.

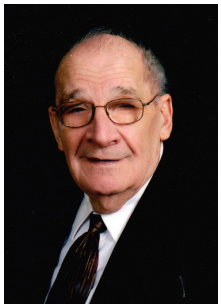
After earning his doctorate in engineering in 2000, his research interest turned toward applying his computational expertise to cancer research. Still relatively new, the field of bioinformatics employs computational and statistical approaches to enable new discoveries from various genomic datasets.

After 3 ½ years of bioinformatic research at NorthShore University HealthSystem in Evanston, Illinois, he joined the SDSU faculty in August 2007.

He recently developed computational tools (iDEP and ShinyGO) that have helped tens of thousands of scientists from around the world to make sense of genomic data. He also likes to conduct exploratory investigations on selected problems, such as mammalian embryo development, by massively re-analyzing published data with the goal of producing novel, actionable insights.

Ge also enjoys teaching bioinformatics and introductory data science classes through project-based learning.

FACULTY NEWS



GERALD BERGUM, 89, of Brookings, a faculty member in the mathematics department for 30 years, died Jan. 17, 2021, at United Living Center.

Bergum joined the faculty in 1970 after earning this doctorate at Washington State University. He taught until 1984, when he took a year to earn his master's degree in computer science from the University of Minnesota. When he returned in 1985, he served as temporary department head. In 1987, he became the first permanent computer science department head, a position he held until retiring June 30, 2000.

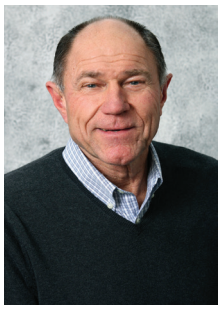
Bergum also was active in the community and a strong financial supporter of SDSU.

In 2000, Bergum was an honorary grand marshal for graduation. In 2001, he was co-chairman for the United Way fund drive. In 2005, he received the Friend of Education Award from the Brookings Education Association. Since 1986, he and his wife funded scholarships for computer science, theater and the Jackrabbit Guarantee.

For 18 years, he edited Fibonacci Quarterly, an international math magazine, and in 1998 received the dedicated service award from the journal.

Survivors include his wife of almost 70 years, Shirley; three sons, Gerald Jr., Keith and Philip; five daughters, Barbara Myers, Roxanne Snow, Jennifer Klingbile, Faith Bradley and Emma Bergum; a son-in-law, Patrick Solsaa; a daughter-in-law, Antonia Bergum; 12 grandchildren, 24 great-grandchildren, two great-great-grandchildren and a brother, Ronald.

He was preceded in death by a brother, Andrew; a son, William; a daughter, Patricia Solsaa; and a son-in-law, Donald Meyer.



CLIFF REUER, a technical assistance provider with Local Transportation Assistance Program, received his pin for 50 years of employment with the State of South Dakota at a Feb. 23 transportation conference.

Reuer, of Pierre and an employee of the college program since September 2009, served as chief traffic safety engineer for the Department of Transportation for 30 years. He went to work at the DOT in 1970 as a field technician conducting materials testing, surveying and project inspection.

Other positions he held at the DOT included highway beautification agent (billboard and junkyard control), maintenance analyst (highway maintenance budgets, new product experiments, trainer for asphalt surfacing operations); project engineer (supervised asphalt projects, supervised highway striping and signing crews, conducted traffic studies) and traffic safety engineer (evaluated high traffic crash locations to determine countermeasures).

At LTAP, his duties include working with local governments to conducting training for highway work zone/construction signing and to provide recommendations for traffic safety improvements, highway safety plans, traffic control signing, gravel surfacing quality, roadway re-shaping and culvert installation.

ANAMIKA PRASAD, an assistant professor in the mechanical engineering department, has been awarded a fellowship in the Air Force Research Lab Summer Faculty Fellowship Program in the materials and manufacturing sector to work on "Computational Mechanics of MXene-based Composites and its Interfaces using Bioinspired Materials Design."

It is an eight- to 12-week continuous on-site program with a variable start date.

TERESA KEYS HALL

RETIREMENT NEXT STOP FOR CONSTRUCTION,

Dickens' opening line from "A Tale of Two Cities"—"It was the best of times, it was the worst of times"—tells much of Teresa Keys Hall's life in the Jerome J. Lohr College of Engineering, but certainly not all of it.

In fact, the closing line from "It's a Wonderful Life" might be more accurate—"Remember no man is a failure who has friends."

On April 21, Keys Hall is taking her final curtain call in the college when she retires as head of the Department of Construction and Operations Management. She started her SDSU career Aug. 4, 2003, as head of the Department of Engineering Technology and Management. More than the name has changed in the past 17 ½ years. Joys have been mixed with tears, but Keys Hall also couldn't be happier with her adopted home.

She landed here after 11 years at Northern Iowa, where she was an associate professor in the Department of Industrial Technology.

LEARNED MANUFACTURING DURING DEERE YEARS

A native of eastern Kansas, Keys Hall spent her high school years in Cedar Falls, Iowa, and after few years of working in retail after graduation, she landed a choice job working for the area's major employer—Deere & Co. At age 23, she was making good money working as a foundry maintenance mechanic at the Waterloo Foundry, one of five Deere plants in the Cedar Valley.

After two years, she was promoted to management as senior maintenance planner and transitioned to metallurgical lab analyst for two years and back to senior maintenance planner in 1984.

She served in that role for three years; three years when the American farm economy sent many an operator off the farm as prices went south and inflation went north. Deere Waterloo went from 13,000 employees to 7,000 in those years. Keys Hall, who married Doug—also a Deere employee—in 1986, avoided the cuts until her "involuntary separation" in 1987.

Keys Hall made it a lemonade moment.

"It was a great opportunity to rethink what was important. I took a year off, completed my bachelor's degree and had our son, Ben," she recalled.

ON TO ACADEMIA

In 1989, she returned to Deere as an industrial consultant on a contract basis. Within six months, she knew that wasn't what she wanted to do. Keys Hall decided she wanted to fulfill the dream she had upon graduating from high school—to become a teacher. She went back to Northern Iowa to pursue a master's degree in manufacturing process development.

She finished her master's degree in 1991 and landed an instructor position in the Department of Industrial Technology. While teaching full time at UNI she earned her doctorate at Iowa State. Twice promoted, she was ready for a new challenge when she saw an advertisement for the head of the department that once was named general engineering.

Keys Hall interviewed in May 2003. She found SDSU and Brookings to have a different feel from Northern Iowa and Cedar Falls.

"At Northern Iowa, it was very bureaucratic with many layers in the hierarchy. Here, it was very low key but positive. Peggy Miller was president. Carol Peterson was vice president of academic affairs. It had a very people-centric feel here," said Keys Hall, who found it encouraging to find other women in top university leadership.

The clincher? "Dean Lew Brown would not take no for an answer. He was so persistent," Keys Hall said. She and her family moved to Brookings in a one-month timeframe. "We never looked back."

FACILITIES TRANSFORMED DURING STATE YEARS

One thing Keys Hall didn't see during her interview was the department offices. They were on the third floor of Wenona Hall. Shops and classrooms were across campus.

But two weeks after she started, the department moved into the renovated Solberg Hall. The yearlong project left the exterior intact while completely gutting the interior and lowering the basement 2 feet. The finished product created 55,735 square feet of classrooms, computer labs, department research labs, electronics and prototype labs.

Fourteen years later, the adjoining Chicoine Architecture, Mathematics and Engineering Hall opened with more than 6,000 square feet of lab for Keys Hall's department and shared with the mechanical engineering and architecture programs.

Connected to Solberg Hall and built over the footprint of Solberg Annex, it contains many of the machine tools and lab equipment that were in the old annex.

ROLLER COASTER MOMENTS

Enrollment in the Department of Construction and Operations Management has bounced from 200 to 400, depending on the economy. A roaring economy means more in the workforce and fewer in the classroom. Today, it stands at 280. Three programs are accredited, including construction management, the department's largest.

In 2006, the manufacturing engineering technology and electronic engineering technology programs followed construction management's lead in accreditation.

But accreditation was no insulation for what would happen in 2011. The Great Recession of 2008-09 took a while to be felt in South Dakota. But as tax receipts dwindled, the legislature cut budgets. That extended to the Jerome J. Lohr College of

TRAILBLAZER

Throughout her career, Teresa Keys Hall, head of the Department of Construction and Operations Management in the Jerome J. Lohr College of Engineering, has marked a number of milestones for women.

But her first came before she even knew what a career was. "As the eldest of 10, I was dad's helper in the garage. I learned how things worked, which gave me confidence. When I heard Deere was hiring maintenance people, I applied," Keys Hall said. She was hired at age 23 and began blazing trails.

However, she didn't set herself up as a role model. "I prefer to serve as mentor. If I can guide and support others when they encounter obstacles, I have repaid the women and men who did the same for me along the way."

- First cohort of women in Deere Foundry Maintenance skilled trades (4 women, 200 men), 1977
- First female, Deere Foundry Fire Brigade, 1978
- First female maintenance planner, Deere Foundry & Central Engineering Services, 1979
- First female tenured in University of Northern Iowa Industrial Technology Department, 1999
- First female department head in SDSU's Jerome J. Lohr College of Engineering, 2003
- First female director in the SDSU Economic Development Administration University Center, 2010

Engineering. The manufacturing engineering technology and electronic engineering technology programs were eliminated.

"It was tough. We had to tell people they were losing their jobs," Keys Hall said in a somber moment as she recalled the conversations.

Kurt Cogswell, head of the Mathematics and Statistics Department, said, "This would be any department head's worst-case scenario, but Dr. Keys Hall took it as both a challenge and an opportunity.

"She knew her department's mission and faculty had tremendous value to offer to the state, the region and SDSU's students. She rallied her faculty and led them in the creation of refocused academic and outreach programs that delivered value even more effectively than had been the case in the past."

Being able to do so, Keys Hall said, is a compliment to those who remained. The electronic engineering technology's demise was short. Sign and scoreboard manufacturer Daktronics Inc. deemed the program was vital to its operations and funded the restart of the program in 2012. Currently, 48 students are enrolled.

NEW NAME, NEW ACCREDITATIONS

With greater emphasis on applied and technical management programs, the Department of Engineering Technology and Management needed a new name. By the 2012-13 academic year, it was reborn as the Department of Construction and Operations Management in a nod to the program's biggest program and the increasing emphasis on operations in the private sector.

Since their initial accreditation, the three programs have all been accredited by ABET, which accredits engineering, technology and applied science programs.

Within the current school year, the department has received $250,000 to fund a professor of practice in heavy construction and at least $200,000 per year for five years to start a concrete industry management program in the fall. Both are funded by their respective industries to fill entry-level management positions and put advocates for their fields in the classroom.

In response to the construction of an Amazon warehouse in Sioux Falls, Keys Hall said the department also is adding an emphasis in supply chain management.

"We try to be as responsive as possible in meeting the needs of industry and fulfilling our land-grant mission," said Keys Hall, adding the input from the department's industry advisory council during her tenure have been important in keeping this in focus.

GRADUATE DEGREE ADDED IN 2016

She also is proud of the Master of Engineering degree that was created in 2016 and was the second graduate program in the department, the master's in operations management being the first.

"Bringing the new degree online took three years of concerted effort ... (but it) has provided advancement opportunities for working professionals in technical managerial roles and a one-year path to a graduate degree for matriculating engineering seniors," Keys Hall said.

Through the years, she has served as an accreditation evaluator, chaired a task force charged with developing a management minor for the university, directed a university outreach center that completed 58 projects for regional manufacturers and has written hundreds of pages on curriculum content.

RETIREMENT TO BRING WEEDING, WATERING

But last summer the Halls downsized, moving into a single-story home. There is limited space for textbooks, shop manuals and garden catalogs. The garden catalogs will win out.

By retiring in late April, she won't have to sacrifice gardening time to write administrative reports or teach grad classes. Her countdown calendar began Jan. 1, but she smiles as she reminisces about SDSU.

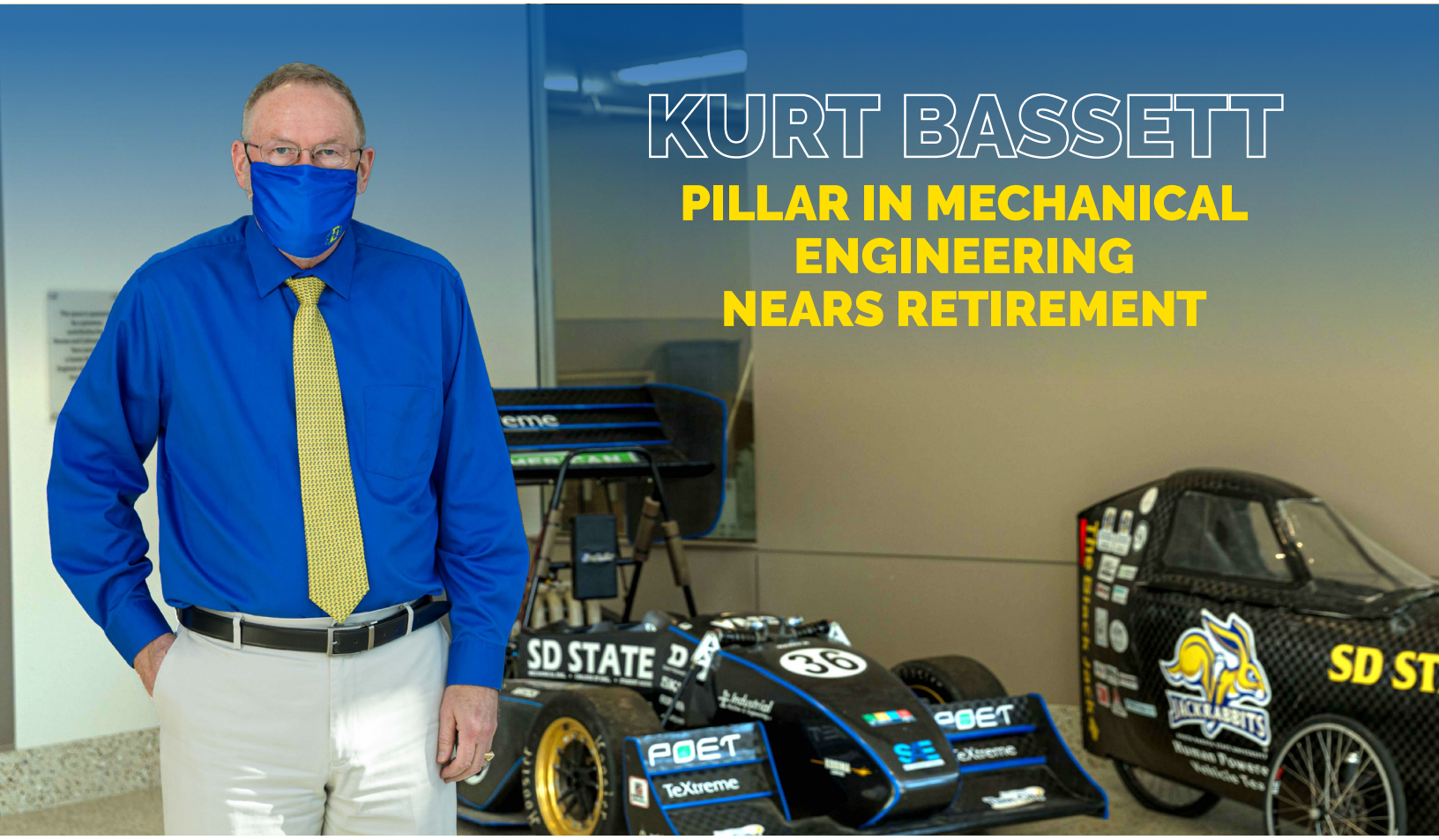
"There are good people in this department, and they work hard. You don't get anything done if you don't have everybody pulling in the same direction on the oars. I can't say thank you enough to the faculty and staff I have worked with over the years."

Compliments also flow back to Keys Hall.

"Dr. Keys Hall arrived at SDSU with a rare combination of industry experience, academic expertise and departmental vision. Once here, her clear commitment to the success of her students and colleagues and her willingness to lead by example allowed her to leverage that rare combination to produce a remarkable record of administrative achievement, and earned her the admiration and respect of all who knew and worked with her.

"Her contributions will continue to have an impact in her department and across the campus and region far into the future," said Cogswell, who chairs the search committee for Keys Hall's replacement, which is expected to be in place by August.

Dave Graves



KURT BASSETT

PILLAR IN MECHANICAL ENGINEERING NEARS RETIREMENT

Forty years after graduating with a degree in ag engineering, Kurt Bassett is again ready to leave South Dakota State, this time retiring as head of the mechanical engineering department.

Bassett retires June 21 after 14 years as department head. All but six years of his career have been at State; the parentheses being two years at North Dakota State earning a doctorate and four years with Johnson Controls in Sioux Falls.

"It's been rewarding being able to support faculty members and students, to see the program grow and bring new faculty in who have really had an impact on the program," Bassett said from the offices of the recently remodeled department suite in Crothers Engineering Hall, one of many facility upgrades done in his tenure.

Bassett was the oldest of four children of Donn and Shirley Bassett, dairy farmers near Wilmot. His mom got a two-year degree to become a country school teacher. His parents encouraged the children to see the value in all forms of education. So where is a northeast South Dakota farm boy to go but State?

LANDS AT STATE IN 1977

"But when it came to choosing a major, I had no idea. I figured it should be something to do with farming, so I started in agronomy," Bassett recalled.

His adviser noticed Bassett had been slotted for precalculus, a higher level than needed for agronomy. "Perhaps you should try engineering," he offered. After a semester, Bassett switched to ag engineering, took a power and machinery focus and got involved with the American Society of Agricultural Engineers presenting reports at conferences and building the Hobo Day float.

"It was a very small program, probably 20 students per class. You got to know all the students in the program, especially upperclassmen," he said.

When he graduated in 1981, he was well-prepared for a job, but there weren't many jobs and Bassett pursued a master's degree in ag engineering. By Aug. 7, 1982, he was married. His wife, Susan, was working as a nurse at Sioux Valley Hospital (now Sanford) and they were living in Sioux Falls. Bassett was commuting to campus.

Late summer 1983, he got a call from Larry Hooks, mechanical engineering department head, whom Bassett knew only from taking a class under him.

"'We desperately need somebody'" after one of the department's new hires didn't show up, Bassett recalls Hooks telling him. At this point, Bassett had completed the diploma hat trick, but had an empty hat when it came to job offers. So he took the job and found he enjoyed working with students. "I learned more than they did," he said.

Bassett taught the measurements and instrumentation labs and thermodynamics for "nonbelievers," Bassett said with tongue planted in cheek.

'IF YOU WANT TO STAY …'

Hooks appreciated his work and asked Bassett to stay another year. He did so. Ernie Buckley, who also arrived in 1983, was the college's dean and offered some simple advice to Bassett: 'If you

want to stay in this business, you have to get a Ph.D.'

Bassett did, so he took a leave of absence to pursue a doctorate in mechanical engineering from North Dakota State, working as a graduate assistant there in 1985-87.

He returned to the SDSU faculty teaching various classes, including senior design, which then was a two-credit, one-semester class with "canned" projects that carried little meaning for students, Bassett said. "We started reaching out, going to local companies to see if they had an engineering problem students could work on."

He was among the first engineering teachers to integrate industry-sponsored senior design projects.

Now senior design is a two-semester, four-credit capstone class with student teams working together, in most cases to solve an industry problem.

Mike Twedt, a senior lecturer in the department and a 1992/M.S. '94 graduate, said, "HVAC and senior design were notable classes I took from (Bassett). He was a great role model for me. I am teaching these classes now, and I draw on what he taught every week."

Bassett said his early years as an educator were heavily influenced by his officemate, Clayton Knofczynski, a Hogan Award winner for teaching excellence. "He was a tremendous mentor on how to interact with students, how to have high expectations of students and yet be compassionate," Bassett recalled.

Troy Erickson, '91 mechanical engineering graduate and now sports solutions manager at Daktronics, said, "Kurt has always had the student success at heart. He also believes in developing well rounded students that can interact well with teams, communicate effectively and continue to learn throughout their career. He relates well with students, is easy to approach and talk to, and does his best to help."

DIRECTS INDUSTRIAL ASSESSMENT CENTER

In 1993, Bassett transitioned from the classroom to director of the U.S. Department of Energy Industrial Assessment Center at SDSU.

SDSU was one of 30 universities selected nationwide to identify energy and production efficiencies that small- and medium-sized manufacturers could achieve. "It was one of the best programs I can imagine that the government spent money on. We hired graduate and undergraduate students. They evaluated companies' processes for energy efficiency and how they used resources in the production process.

"We only had a day at the plant so the students had to know in advance what needed to be studied ... they were basically functioning as engineers," Bassett said.

The center served Minnesota, South Dakota, northwest Iowa, southeast North Dakota and northeast Nebraska for 10 years. Bassett was there for eight years.

TIME IN PRIVATE SECTOR

In 2001, he went to work for Johnson Controls in Sioux Falls, doing system designs and retrofits for energy-saving projects. "I learned so much from project managers and technicians." Bassett also learned that if he wanted to advance, he would need to move to Minneapolis or Milwaukee.

When former department head Hassan Gazzi retired in 2005, there was an opening on the faculty and "I had missed the teaching part of the job," he said. His experience with Johnson Controls was useful when teaching HVAC classes. "We've had a lot of students go on to work in the HVAC industry. That was good for inspiring students to get into that."

Early in his tenure at SDSU, he had founded the student chapter of the American Society of Heating, Refrigerating and Air-Conditioning Engineers and served as its faculty adviser for many years.

The next step on Bassett's academic career was as unexpected as the first.

"I had no thought of being a department head. Don Froehlich unexpectedly announced his retirement and I was appointed interim (effective July 1, 2007)." He applied for the permanent position, and his selection was announced April 2008. Bassett continued to teach HVAC courses through spring semester 2017.

"As the department grew, I didn't feel I was giving justice to the students," he explained.

A BIGGER, BETTER DEPARTMENT

Academically, he oversaw the addition of the doctorate in mechanical engineering (first classes began in August 2020) and a sustainable energy systems minor in 2011.

When he started on the faculty, there were 8.5 faculty positions and 250 students in the major. Now there are 15.5 faculty positions and 450 students. Graduate school enrollment has remained relatively stable at 35 students.

The hallways of Crothers Engineering Hall are much more crowded (at least in a normal year), but the original 1957 building is much more comfortable, too.

The three-story building has been the target of major improvements in the last two decades, beginning with the eastward expansion and HVAC upgrade in 2003. The most recent work was upgrading the civil and environmental engineering department offices in the fall. The mechanical engineering office suite was completed in 2018.

Bassett remembers the suite as a metallurgy lab when he was a student. Then it became a conference room and computer lab until being made a suite.

The 62,000-square-foot Chicoine Architectural, Mathematics and Engineering Hall opened in 2015 with shared lab space and dedicated space for senior design projects. That area had been in the heat and power shop about two blocks north of Crothers. "The old heat power lab was about 100 years old when we left it," Bassett said without exaggeration.

Now, when counting shared spaces, the department has four times as much lab space, he estimates, and the building directly faces Crothers.

Erickson, who has stayed abreast of the department by serving on its advisory council, said, "I look at the program today and am envious of the opportunities for current students in the program in both curriculum and facilities. The mechanical engineering program has come a long way under Kurt's leadership: improvements in facilities, curriculum and ongoing increase in enrollment.

"SDSU design teams have been quite successful in competing on a national stage, beating highly publicized and big budget engineering schools. The graduates of this program are in high demand throughout the region due to understanding that they have a strong technical background and a well-rounded education and experience."

HIGH PRIORITY ON STUDENT COMPETITION TEAMS

On display inside Chicoine Architecture, Mathematics and Engineering Hall is the prior year's Formula SAE car and ASME Human-Powered Vehicle, products made by student teams for professional society sponsored contests. In recent years, SDSU has been one of the leading schools in the nation in the human powered vehicle (bike) competition and also has done well in robotics, 3D printing and various NASA contests.

Calling the achievement of those extracurricular student competition teams "a real proud moment," Bassett said "I was happy to do what I could to provide resources for them. We've proven we can outshine the bigger schools. That is due to the dedication of our faculty supervising them and the caliber of the students themselves."

Dedication also is a word that could be applied to Bassett.

Twedt, who has worked with Bassett since 1992, said, "As the head of SDSU's largest engineering department, he is typically overloaded with myriad administrative responsibilities. However, he has a stellar reputation for always making time for students, advisees and faculty no matter how swamped he is. He has worked tirelessly to improve the department."

FISHING AND WORKING ON TO-DO LIST

A search for a new department head is underway with the anticipation of having the position filled by fall.

Bassett said he won't have to search hard to find retirement activities. "I have a lot of projects piled up at home" north of Volga and "I may do some consulting work." He also plans to fish and visit grandkids. Kurt and Susan, who plans to continue teaching nursing at SDSU, have three sons and four grandchildren.

The family of students he has influenced would be in the thousands.

"A lot of students I taught the first time around are presidents and vice presidents of their companies. I felt inadequate then. But from one side of the desk to another, the perspective is different. They've already got the potential to do what they do. We provide them with tools to unlock the potential they have."

Dave Graves

OHLSEN RETIRES AFTER 15 YEARS AT STATE

After 15 years on campus, accounting assistant Sheila Ohlsen retired Jan. 21.

For most of the past 11 years, Ohlsen split her time between the mathematics and statistics, and civil and environmental engineering departments. Since July, she split her time between the dean's office and math and statistics. From September 2005 to May 2009, she was a secretary for the TRiO program in the Multicultural Center.

Kurt Cogswell, head of the mathematics and statistics department, called Ohlsen "a great colleague and friend who was an important part of our department. While with the department, she faced everything from significant health difficulties to the daily frustrations that accompany working with budgets.

"Through it all, she was unfailingly cheerful and ready to take on the next challenge with a laugh and a smile."

Her duties included balancing bank accounts, paying the bills, ordering, answering the phone and entering data and processing it.

She said the biggest challenge in her job was keeping up with regulatory and procedural changes.

"I like learning new things, but ... " Ohlsen said.

Her favorite SDSU memories are being named civil service employee of the year by the Jerome J. Lohr College of Engineering in 2013-14 and SDSU civil service employee of the month in August 2012. Ohlsen also recalls breast cancer surgery in 2013. "The secretarial staff made food and brought it to my house after surgery. My bosses, Dr. Cogswell especially, were very considerate. Everyone was very helpful, very supportive."

Her hobbies include crocheting, cross stitching, sewing, making baby blankets for unwed mothers at the hospital and other fundraisers as well as spending time with family.

A native of Volga and a 1972 Sioux Valley High School graduate, Ohlsen has three children: Shawn (Dawn), of Castlewood; Kris (Eric) Anderson, of Ghent, Minnesota; and Kimberly (Brian) Klavetter, of Sioux Falls; and six grandchildren.

"I enjoyed my time at SDSU, the students and the employees. It was a very pleasant place to work," Ohlsen said.

Dave Graves

WILLIAM BLOXSOM

STUDENTS FIND THERE'S A STORY FOR EVERY PROBLEM

Stoked by a five-decade career that has seen him investigate numerous fatal traffic accidents, help build a new U.S. Navy destroyer and measure the vibration from a 5,000-horsepower engine, lecturer William Bloxsom enters the mechanical engineering classroom with a ton of experiences in which to relate real-world examples.

In fact, Bloxsom is such a student favorite that when word got out he was retiring after spring semester, his classes overflowed.

Daniel Sharp, who is majoring in both mechanical engineering and dairy manufacturing, was one of those late entries into Bloxsom's dynamic systems lab. "I was convinced by a friend to take dynamic systems lab because it was his last semester. I really enjoy his teaching style. I'd rather take a difficult class from a teacher I know than from a new hire. He's my favorite teacher. It's an 8 a.m. lab and it's not hard for me to get up."

Sharp said Bloxsom's style is a mix between laid-back and passionate.

"He's not super strict about when homework is due. He's not a high-strung individual. But he's really passionate about us knowing the material and if we don't, he goes out of the way to help us get it down. For example, when we move on to a new concept, he continues to bring up an old concept so we know how it would apply," Sharp said.

Then there are the stories.

Like how friction factors into a car speeding around a corner or when deciding which set of springs to put under a motor chassis, always use the softer springs. Bloxsom said those were lessons he learned when doing accident reconstruction and vibration work.

FROM TEACHING SHOP TO LIFE AS A COP

Born and raised in Long Island, New York, Bloxsom escaped to the small southern Michigan town of Ypsilanti to attend college at Eastern Michigan University. He worked as a machine tool draftsman while obtaining a degree in industrial education (1972) and, when he could not find a job as a shop teacher, he switched gears.

He then joined the Ann Arbor, Michigan, police force. After four years, he went to the Lakewood, Colorado, Police Department.

"I spent 20 years there, the last 17 of which were as a detective. I dealt exclusively with fatal and serious injury traffic accidents. I felt the victims needed a more knowledgeable advocate and went to the University of Colorado at Denver part time for 11 years at night to get my first two mechanical engineering degrees (bachelor's 1985/master's 1991)," he said.

A PH.D. AT UNLV

Next stop was Las Vegas, where he earned a doctorate in mechanical engineering at UNLV.

Also there he "taught advanced topics in accident reconstruction for the National Institute of Justice to police officers all over the country. I had a sound education in math and physics and spoke 'cop' at the same time. When I got the doctorate (2003), I was my own boss doing forensic engineering.

"Then I decided I wanted to exercise more of my education and got a job as a principal engineer in system acoustics for General Dynamics in Bath, Maine. For two years I worked on the new generation Navy destroyer, the DDG-1000," Bloxsom said.

He got into higher education in 2008 at Colorado State University-Pueblo (tenure track) and then Minnesota State-Mankato (2011) as an adjunct. Also in Mankato, he worked for an international company doing vibration and acoustic work on 5,000-horsepower stationary diesel engine generator sets.

IN 7TH YEAR AT SDSU

He arrived at SDSU in August 2014 and has taught classes in vibrations and dynamics and a dynamic systems lab.

"I have been assigned to teach sophomore-, junior- and senior-level classes every semester. I enjoy watching my students mature as they go through the program. I have many casual conversations with the students in my senior lab class. I enjoy hearing where they are applying for work and learning who has hired them.

"I listen to them and know that they are ready to be engineers. I feel proud knowing that I have been a small part in that transformation. At 140 to 170 students a semester, I see proof many times over we as a faculty are doing our jobs," Bloxsom said.

So it's no surprise that what he enjoys about teaching—other than summers off—is the students.

"I like to think that my years spent doing something besides teaching has provided me with some insights that I occasionally share with my students," he said.

RETIREMENT: TRAVELING WITHOUT ALARM CLOCK

Reflecting on 50 years of employment, Bloxsom said, "It may sound trite but this has been the best seven years I have spent. I have had great co-workers and supervisors. The students from this part of the world are the most grounded I have ever known. I have gone home many days telling myself that I cannot believe they pay me to do this."

Nonetheless, he is going to step away from that paycheck.

However, he does plan to keep his base in South Dakota and spend half the year traveling. "I am entertaining the idea of buying a small Airstream (trailer). My first two granddaughters were born last summer in the Denver area. Due to the pandemic, I have not seen them in person and plan on rectifying that.

"And I am seriously contemplating retiring the alarm clock I have had for 47 years," Bloxsom said.

Dave Graves

Instructor Zac Chapman works in the new measurements and instrumentations lab on the first floor of Crothers Engineering Hall.

RENOVATIONS CONTINUE IN CROTHERS

Buoyed by key donations from more than 30 alumni, the head of the Department of Civil and Environmental Engineering is in a better place today.

In mid-September 2020, Nadim Wehbe and his staff moved into a newly remodeled office suite on the third floor of Crothers Engineering Hall. In addition, eight faculty offices moved from first to third floor. Three other offices will move in time for the 2021-22 school year.

Meanwhile on the first floor, the mechanical engineering department is enjoying expanded and renovated labs after moving from the third floor.

These changes are the latest in a series of improvements made to the 1957 engineering building that bears the name of legendary professor and dean Harold Crothers. The upgrades started in 2003 with a major expansion and renovation.

"The new CEE suite offers a fresh new look when welcoming students, faculty, staff and visitors," said Wehbe, whose office had been on first floor as well. "Visitors used to have to wait in the hallway if they arrived before their appointment. Now we have an open, inviting reception area for visiting students and parents."

Also in the suite is an office for Christopher Schmit, director of the Water and Environmental Engineering Research Center, and support staff members Lisa Enstad and Tammy Loban as well as a work room and a file storage room.

All those areas were separate from the department head's offices before.

"This allows for better accessibility when making copies, finding supplies, filing, etc.," senior secretary Enstad said. "It's an enjoyable place to work, and I am glad that the transition went very smoothly."

It puts the department on par with the office suites for mechanical engineering and the dean, which are on the second floor of Crothers.

Wehbe thanks the generosity of civil alums. "These individuals and their companies continue to be faithful benefactors of the department. This never would have happened without their support," Wehbe said.

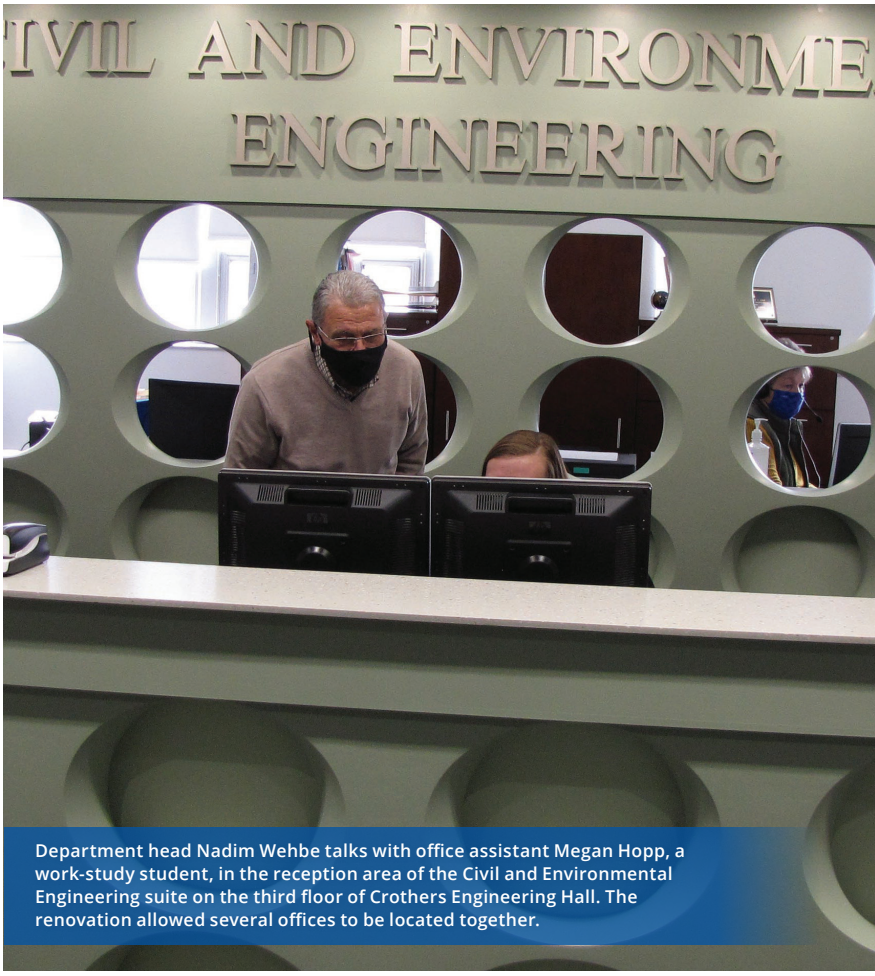
The project was fully funded through gifts from 32 individuals and four companies.

ASCE CHAPTER ALSO TO BENEFIT

In addition, Ralph Lindner '75, president of GeoTek Engineering, is supporting the cost of an office for the SDSU chapter of the American Society of Civil Engineers.

Spencer Gilk, ASCE president, looks forward to the office. "The ASCE chapter officers often spend a collective 40-plus hours a week working on various chapter duties. An office would help us have a central organizing point for the officers and competition teams, as well as a physical location for chapter members to access chapter resources."

Students prepare for a project in the new lab space.



Department head Nadim Wehbe talks with office assistant Megan Hopp, a work-study student, in the reception area of the Civil and Environmental Engineering suite on the third floor of Crothers Engineering Hall. The renovation allowed several offices to be located together.

Among the faculty members enjoying a third-floor office is assistant professor Michael Pawlovich, who noted, "Now I'm right next to my lab instead of a utility lab; and now I have an outdoor view instead of a concrete wall."

Students in the relocated computer lab, built next to the department head's office suite, also can enjoy a southern view while fighting with homework assignments from civil and mechanical engineering faculty members. The shared lab, which had been downstairs, has seating for 30, but with COVID-19 restrictions is now set up for 20.

ME LABS: BRIGHTER, MORE OPEN

Kurt Bassett, head of mechanical engineering, is equally happy with the new lab spaces on first floor.

The new measurements and instrumentations/thermal fluids lab had been in that space until moving four years ago to provide temporary space for the dean's offices while they were being remodeled.

The new instrumentation lab is "much brighter and more efficiently arranged," Bassett said. "Cabinets and islands that took up space and weren't needed were removed. Now the space is more flexible with lab tables that can be moved as necessary. The sink is in the corner rather than the middle of the floor. Also, a hallway window was added, which is nice when giving tours to campus visitors."

The lab has more space than what it was allocated on third floor, though slightly smaller than when previously downstairs.

Bassett said the downstairs space used to include part of what is now the dynamics systems lab. The dynamics systems lab also includes what was once a department technician's shop. That now is in Chicoine Architecture, Mathematics and Engineering Hall. The dynamics instructional lab is used for motion analysis, vibration studies and testing of programmable logic controllers.

"These spaces were originally designed for laboratories. By brightening and decluttering them, they make a perfect instruction place for our students," Bassett said.

Dave Graves

ENGINEERING EXTENSION

MAKING SOUTH DAKOTA A SAFER PLACE TO WORK

"A healthy and safe workplace is a right every worker should have," declares Teresa Keys Hall, head of Engineering Extension within the Lohr College of Engineering.

Part of the college since the early 1980s, Engineering Extension handles on-site consultation for the federal Occupational Safety and Health Administration in South Dakota. The consultations are free to businesses with funding coming from OSHA and the state. The services are completely confidential. Even OSHA can't access the reports.

Greg DeRynck has served as program director for Engineering Extension since August 2017 and has been on staff since September 2011.

He oversees five other consultants and an administrative assistant. Their workload varies, and, of course, during the COVID-19 pandemic, on-site visits have been reduced. But DeRynck said the office typically makes 150 to 250 visits per year to "any business from a nursing home to a foundry and everything in between. Manufacturing, service, construction, gas stations, hotels, small medical clinics and dental offices are all examples of firms visited, he said.

WHAT IT MEANS TO BE SHARP

One of those firms is Dakota Tube in Watertown.

The family-owned firm primarily manufactures hydraulic tube assemblies for major construction and agricultural companies. Dakota Tube is one of three OSHA-designated SHARP companies in South Dakota (also Applied Engineering, Yankton, and Mitchell Manufacturing, Mitchell). SHARP (Safety and Health Achievement Recognition Program) firms must have a lower than average national injury rate and show a willingness to continually improve safety and health in the workplace.

"It has made us a really safe business to work for. We were able to use the OSHA consultation to really change the atmosphere here completely," said Amanda Murray, Dakota Tube safety director.

The firm gained the designation a year ago, she said.

Dakota Tube started using OSHA consultation eight years ago to ensure compliance with OSHA regulations, Murray said. At the time, its injury rate was 1.5 times the national average. Now it is half the national average. The improvement lowered workers' compensation insurance rates and makes the firm a desirable place to work, she said.

"Every single operator goes through a robust safety training program when they start. There is a refresher on safety annually or when changing positions. The more and more senior somebody gets, the more and more safety training they receive," Murray explained.

SAFETY NO AFTERTHOUGHT NOW

Safety has become a part of the planning process when acquiring new equipment, not an afterthought, she said.

For example, as Dakota Tube has expanded into robotic bending, an early question was "what do we need for engineering controls around these robots? Engineering Extension provided the standards to refer to," Murray said. The consultants look at "what sort of hazards might be present and how you can engineer that out, how can you avoid this hazard."

As a SHARP business, Dakota Tube is granted an exemption from OSHA-programmed inspections for up to two years and subsequent renewal for up to three years.

Nonetheless, Dakota Tube usually has annual consultations. Murray admits, "The first time you do it, you're really nervous. But the guys are really great. They have an opening conference to explain what they will do, and they communicated with us before so we will know what we need to supply them."

DeRynck added that free air sampling and noise surveys are available to businesses even if they aren't seeking SHARP designation.

Dave Graves

LTAP HELPS CREATE SMOOTH, SAFE RIDE

Free advice is worth what you pay for it.

That common saying holds true in most situations, but not when the advice is coming from the South Dakota Local Transportation Assistance Program. LTAP, as it is commonly known, has been giving free advice to local government agencies since 1988 and it is invaluable, according to Mark Schock, assistant highway superintendent in Pennington County.

"The service is free and with very knowledgable staff and friendly service," he said.

LTAP is housed within the Jerome J. Lohr College of Engineering and overseen by Nadim Wehbe, head of the Department of Civil and Environmental Engineering. Greg Vavra, a former Jerauld County highway superintendent, joined LTAP in 2012 and became manager in 2017 after the retirement of longtime director Ken Skorseth.

There are two other full-time staffers: Andrew Peterson, field services manager, based in Vermillion, and Trudy Anderson, program assistant.

Peterson, a 2013 graduate of SDSU's construction and operations management program and former project manager with Knife River construction, is the youngest on the LTAP staff. Technical assistant providers Chuck Fromelt, Gill Hedman and Cliff Reuer all joined after lengthy careers and work an average of 16 hours per week for LTAP.

Fromelt, of Grenville, spent 26 years as Day County highway superintendent. Hedman, of Pierre, was a pavement engineer with South Dakota Department of Transportation for 30 years. Reuer, of Pierre, started his DOT career in 1970, spent 30 years as chief traffic safety engineer and has been with LTAP since 2009.

LTAP funding comes from the Federal Highway Administration with matching support from SDSU and the South Dakota Department of Transportation.

RESURFACE QUESTIONS SURFACE OFTEN

Therefore, when Schock's crew was planning to resurface Longview Road east of Rapid City in fall 2020, he didn't hesitate to ask Hedman to provide technical assistance.

Schock explained that Pennington County was milling a 3-mile section of blotter (thin asphalt) road and adding gravel, then resurfacing. Hedman "came out and taught us how to measure density on our surface material. In some sections, we mixed the base and recycled asphalt. Gill showed us how to measure the density of the mixes.

"We placed a couple test strips within the road so we can monitor them and know better in the future what mix wears best," Schock said.

TRAINING FOR MANAGERS, OPERATORS

On the other side of the state, Mic Kreutzfeldt has benefited from LTAP since late 1991, when he was appointed McCook County highway superintendent. "LTAP played a huge part in my learning and training. I participated in its 'Roads Scholar' program, which was a series of seminars and self-taught lessons on road maintenance and management."

He noted as highway superintendent, "you have to know your roads and bridges, but you have to be a businessperson and manage people also."

Kreutzfeldt said LTAP's gravel manual, put together several years ago by Skorseth, continues to be a "shining star." His road grader operators keep it in their maintainers to reference grading crowns and horizontal curves as well as gravel volumes and qualities.

SIGN EXPERTISE

If there is an issue with county road signs, Reuer is the go-to, he said. Kreutzfeldt recalled a small town that wanted a four-way stop at an intersection. "I kind of knew it wasn't correct, but Cliff came in, did some research and supported what I was trying to say. The word of Cliff goes a long way," Kreutzfeldt said.

In Pennington County, there are 11,000 road signs. A federal requirement mandates annual inspection for nighttime reflectivity or replacement.

LTAP trained the department on methods for assessing the signs and explained the criteria, Schock said. One year, a division didn't get that winter project completed, so LTAP loaned the department a retroreflectometer so the work could be done during the day, he said. "Cliff, he has been wonderful. He has such vast knowledge of signs and work zone safety," Schock said.

Those are just a few of the examples that LTAP staff members are asked to tackle, program manager Vavra said.

SPONSORS 2 CONFERENCES ANNUALLY

LTAP responds to more than 400 technical assistance requests per year. Some can be answered with an email or phone call but others require a visit by the nearest staffer. The office averages a couple visits per week.

In addition, LTAP puts on two major conferences per year.

This year's asphalt conference on pavement preservation, a Feb. 24 virtual event, had 167 people participate. There were 72 local agencies, such as cities, counties and townships; 24 contractors, including engineers; and 71 from area Department of Transportation offices.

The 36th annual North Central Regional Local Road Conference is expected to draw 550 to 600 participants to Sioux Falls Oct. 19-21. The nine-state gathering may also add Minnesota this year because it moved from Rapid City for the first time. Subjects range from gravel maintenance to management training and often include experts on railroads or bridges.

"There is nothing to this magnitude elsewhere in the nation. I don't know of another one in the country that has lasted this long with this participation," Schock said.

The conferences are the only training LTAP offers in which participants pay a fee.

LTAP staffers set a goal to visit each county highway department each year. "I think they do a great job of seeing what is working for somebody and sharing that around the state," Kreutzfeldt said.

Whether consulting on grading or using LTAP's retroflectometer, the bottom line reads the same—free.

Dave Graves

ROBOTIC ADVENTURES

REVITALIZED CLUB LOOKS TO LUNAR EXCAVATION COMPETITION

At the start of the 2019-20 school year, the SDSU Robotics Club was a 10-student organization whose motor had run out of juice following a robot-shooting championship at the NCAA men's basketball Final Four April 7, 2019.

A strong recruiting year more than doubled membership and now with 56 members, the club has aims on winning another national title. This one may even be a longer shot than the free-throw challenge the club nailed in Minneapolis two years ago.

The club started planning for the NASA Robotic Mining Competition in the summer, according to 2020-21 president Ben Diersen, who served as membership chair last year. This is the first year for SDSU to enter the 10-year-old contest, which has been won by the University of Alabama-Huntsville for the last seven years.

"The approach we hope will set us apart from the competition is using a two-robot design," said Diersen, a junior mechanical engineering major.

The front robot mines nonstop while the second robot transports the gravel. "We're mining and transporting continually," the Brookings High School graduate said in advance of an initial Feb. 19 test run before officials from the Jerome J. Lohr College of Engineering. The goal is to collect chunks of gravel that are meant to simulate lunar ice chunks and then deposit the gravel at a collection site.

Eventually, the club plans to have its robots operate autonomously, which gains bonus points. That function wasn't operable Feb. 19.

LUNABOTICS TEAM COMPETING VIRTUALLY

Diersen said the club opted for the mining challenge after winning the BotShot competition two years ago. He noted many schools in the region were fielding a team, and the SDSU students liked the challenge of creating an autonomous entry as well as the prestige of a NASA competition. However, COVID-19 halted the 2020 plans.

The novel coronavirus also will impact this year's contest, which has become a virtual event rather than being at Kennedy Space Center in Florida.

Teams will submit video demonstrations May 17-21. SDSU found out Jan. 25 that it was one of 50 teams selected. Selection was based on designs submitted to NASA, according to Mary Machado, an electrical engineering graduate student from Venezuela and project manager for Lunabotics, the name given to the 24 club members working on the challenge.

While it is a robotics competition, the Lunabotics team is split between EE and ME majors except for one computer science major.

MOST TEAM MEMBERS ARE FRESHMEN

Machado said the biggest challenge "is trying to put what we have in code and paper into reality; getting this vision that we want something to go a certain way, but perhaps tolerance wasn't taken into consideration, so we have to use different design choices, change the code, change the mechanical code.

"The second challenge is how young our members are. Seventy-five percent are freshmen. We have to teach them how to code and perform applications for designing. That takes time and slows progress."

Through trial and error since robot building began in late September, the two robots have gone through literally dozens of changes, from the size of the wheels to the design of the shaker bed for receiving gravel. Teams must collect at least 1 kilogram of gravel during the 15-minute contest in order to be considered for awards, Machado said.

Maximum robot size is 1 meter long and a half-meter wide and high, though its digging arm extends another three-quarters of a meter when competition begins.

CENTERED AT SDSU RESEARCH PARK

The SDSU students have done their best to create a lunar-like surface from which to mine. Ten tons of quarry material was wheelbarrowed into a room that the club has been able to use at the Research Park at SDSU. Wood forms were constructed to hold the material, which includes gravel and small rocks, but the majority is a quarry waste product similar to concrete powder.

Diersen said wheelbarrows were lifted above the forms by four students and then dumped, making that the most physically challenging part of the challenge.

The students also have a spacious workshop upstairs in the Research Park building. The area had been used for storage. When the club lost access to its campus workshop because of COVID-19 restrictions, Research Park officials allowed the students to set up tables for 3D printers, soldering and assembly, said Diersen, who, like all students working there, was wearing a mask.

The 3D printers were used to make wheels, buckets and conveyors. The plastic pieces are cheaper and lighter than purchasing metal parts and also provided greater flexibility, according to mechanical engineering team lead Nick Degen.

STUDENTS MAKE MAJOR EXTRACURRICULAR COMMITMENT

Motors, linear actuators, bearings, sprockets, chains and aluminum for the robot frames were purchased. But the crew used guidance from Tyler Fogelson and his electrical team to provide recommendations on motor purchases. “They wrote this code using MatLab software, inputting torques and forces so we knew what size of motor to buy,” Machado said.

The contest is an extracurricular activity but students give it at least as much effort as a five-credit class. The workshop is open two hours a day, three days a week, plus six hours on Saturday. Team leads have an additional commitment, Diersen said.

Regardless of how much gravel that robots Dig and Dug collect in May, club adviser Jason Sternhagen, research associate III in electrical engineering, said, “By being selected to compete, this club has had the opportunity to grow their engineering and project management skills, which benefits them in future competitions and their careers. It also showcases the high caliber of students in the Lohr College of Engineering.”

BATTLE RABBITS AND SNOWPLOWS

The club is involved in two other contests—Battle Rabbits, a virtual event being organized for high school teams, and Snowplow, in which students won’t compete until January 2022.

Battle Rabbits, a contest similar to the trademarked Battle Bots competition, came about when Sternhagen challenged students to come up with a contest to get high school students excited about the field of electrical engineering and computer science, Diersen said.

“This is a way to get people involved and excited during the pandemic,” he said.

Teams that had previously competed in the FIRST Robotics league were sent an invitation to participate in Battle Rabbits, according to Andrew Worley, who is doing the computer-aided drafting to create the 3D-printed robots. There are seven teams from four high schools entered in the single-elimination tournament April 24.

Robots are shipped to the high schoolers, who then write the code for the robots to compete autonomously in the five-minute contest.

HS EVENT TO BE LIVESTREAMED

The objective is to disable the opponent using one of three weapon choices—a wedge, a long protruding object or a ramrod with spikes.

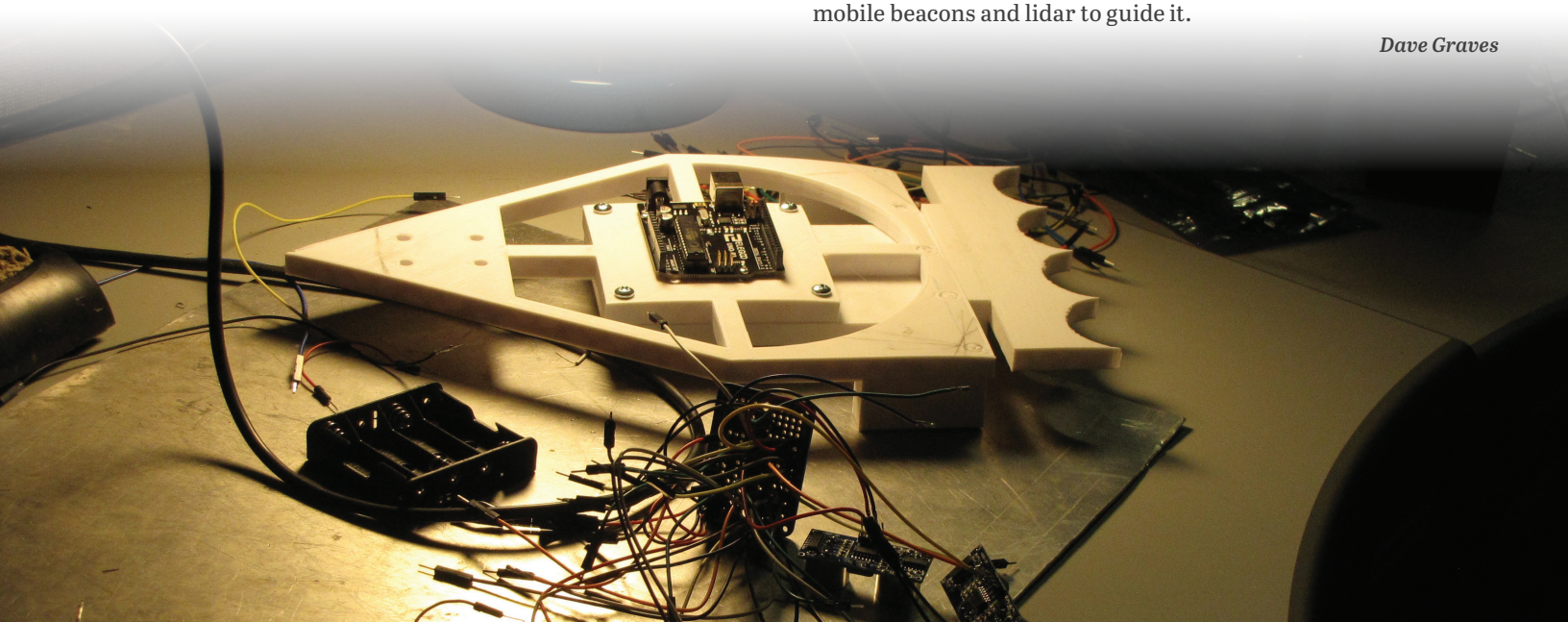
James Loebl, electrical engineering coding team lead, said, “This flips the script compared to our normal projects. Designing the project, rather than creating the entry.”

In future years, he hopes the contest will draw students to campus. This year, students will send their robot to the club for the contest at the Research Park. It will be livestreamed on the robotics club’s YouTube channel at 1 p.m. April 24.

The Snowplow competition is sponsored by the Institute of Navigation, which is a professional organization advancing the art and science of positioning, navigation and timing. Contestants have 20 minutes to clear as much snow as possible from a 15- by 10-meter area using a 2-meter by 2-meter snowplow while avoiding obstacles.

Loebl, who is an electrical team member, said the club started planning for the autonomous contest in January and will use mobile beacons and lidar to guide it.

Dave Graves



YESTERDAY'S STUDENTS SPONSOR TODAY'S SENIOR PROJECT

BROOKLYN VAN DER WOLDE

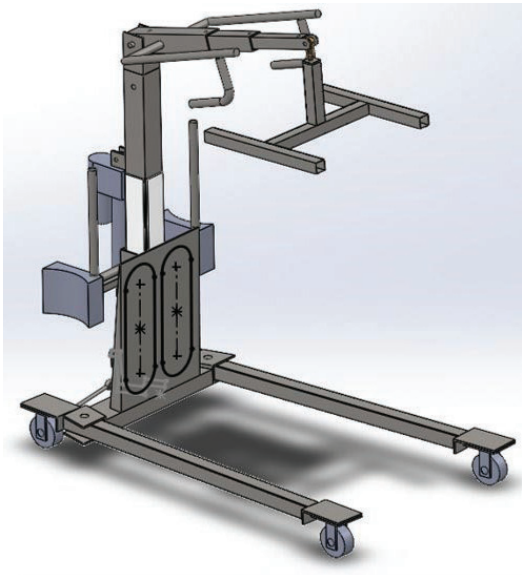
CRAIG JIBBEN

Senior design students typically find their capstone project from a list of industry-sponsored ideas or perhaps get involved in a national competition.

It is unheard of for a pair of students who graduated the prior semester to serve as sponsors. However, that happened in 2020-21 when Brooklyn VanDerWolde and Craig Jibben, both of Sioux Falls, reached out to Todd Letcher, associate professor in mechanical engineering, to sponsor a project for current students.

"We were both working in different nursing homes and saw problems with moving patients, getting them out of bed or transferring them to the toilet. There needs to be something that is easier on nursing assistants and residents. That's why we reached out to Dr. Letcher," Jibben said.

VanDerWolde added, "We were both using lifts all day long for the residents and it didn't seem comfortable. It didn't seem like the best thing out there."



Current mechanical engineering students Christina Gomes, Whitney Schaeffer and Travis Schieltz hope their work on a new type of lift will produce a better alternative. Obviously, it would be years before their design could be on the market. At this point, they just want to have a working model ready for their academic deadline in mid-April.

They were motivated to make a better lift based on what they had seen in use.

PERSONAL EXPERIENCE CREATED DESIRE FOR BETTER LIFT

Schaeffer, of Tripp, had a grandfather who lived in a nursing home. "I saw what they had to go through to lift him. I wanted to see how I could make a difference," she said.

Gomes, of Bangladesh, was a hospital patient herself in August 2020 and had to be lifted from the bed to the shower. The discomfort made her want to make a better lift.

2020 mechanical engineering graduates VanDerWolde and Jibben were working as nursing aides in Vermillion and Yankton, respectively. They wanted hands-on health care experience before taking the medical school entrance exam and are looking to fall 2022 enrollment. At State, they had a biomedical emphasis and a biomedical senior design project.

WINNINGS FINANCE CURRENT PROJECT

Jibben, VanDerWolde and Katelyn Hillson combined to build a prize-winning visual CPR simulator.

The students created a ventilator with a plastic rib cage, silicone heart chambers, acrylic valves and various sizes of tubing. It is the size of a typical CPR mannequin but contains only the chest and heart. Unlike a typical mannequin, students can see how the valves work and get feedback on the rate and depth of the compressions administered.

Their effort won the 13th annual Idea Competition sponsored by the Brookings Economic Development Corporation and then finished second in the Governor's Giant Vision contest, earning a $4,000 prize.

That money is being used to pay for raw materials needed for the current students to make the nursing home lift. VanDerWolde and Jibben also connected with the current students over Zoom to help them understand what was needed and to guide the design without dictating a process.

Because of COVID-19 restrictions, the current students were only able to make one nursing home visit. They saw a lift, but weren't able to see it in operation, Schaeffer said.

NEW LIFT COMBINES 2 LIFTS USED NOW

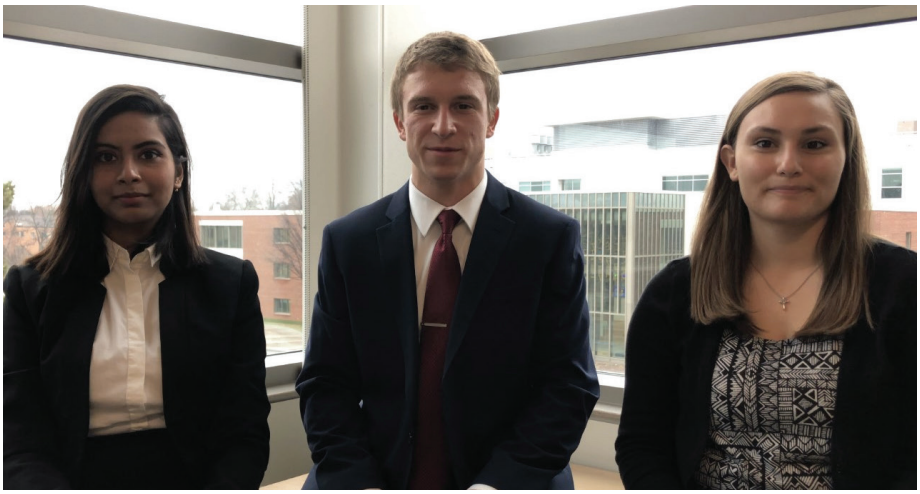
Their final product will combine elements of the two primary lifts used today—a Hoyer lift, which is floor-based with a full-body sling, and an easy-stand lift, which assists seniors who can bear some weight but are unable to safely transfer from sitting to standing. The students' hybrid model is being designed so nursing homes would only need one type.

The sling, rather than being a single piece, is being split into two parts. One fits under the legs and one under the upper body to reduce the amount a patient must be turned to accommodate the sling.

STUDENT NEWS

NATHAN LINKE, a junior mechanical engineering major from Woonsocket, was appointed in December to a one-year term on the South Dakota Farm Bureau Board of Directors.

This is the second year South Dakota Farm Bureau student members have been part of the leadership team of the state ag organization. Linke has been involved in Collegiate Farm Bureau, 4-H and FFA. He was a Farm Bureau Scholarship recipient and served as a state FFA officer.



Senior mechanical engineering students, from left, Christina Gomes, Travis Schieltz and Whitney Schaeffer have built a lift for nursing home residents as their capstone project.

The lift is designed to stand 48 inches high and be 34 inches wide with a 300-pound capacity. Schaeffer and Gomes said Schieltz has agreed to serve as patient. "We hope it doesn't break when someone is in it," Gomes said. Assembly will take place in a shop in Chicoine Architecture, Mathematics and Engineering Hall. They will sew the sling on an industrial machine in the Makerspace area at the Research Park.

The project has given Schaeffer a chance to hone her 3D design skills as "we've had to model this whole lift on the computer." Gomes said the project has grown her skills in wiring and control system operations.

VanDerWolde and Jibben are anxious to see a working prototype on display at the senior design expo.

Associate professor Letcher said, "Brooklyn and Craig were excellent design students. As good designers, they found a real-world problem that needed to be solved and are helping the next team of students figure out how to solve the problem. I'm so glad they are putting some of their Giant Vision award funding toward getting this new product started."

Perhaps some day when they visit a patient at a nursing home, they will see a resident being lifted by a device their contest proceeds helped design.

Dave Graves

ENROLLMENTS BY DEGREE (FALL 2020)

UNDERGRADUATE MAJORS (FALL 2020)	FEMALE	MALE	TOTAL	PERCENT*
Agricultural & Biosystems Engineering	10	67	77	5
Civil & Environmental Engineering	29	196	225	14.62
Construction Management	9	135	144	9.36
Construction Technology (Assoc.)	2	12	14	0.91
Computer Science	15	135	150	9.75
Electrical Engineering	11	129	140	9.1
Electronics Engineering Technologies	5	35	40	2.6
General Engineering	3	6	9	0.58
Operations Management	4	54	58	3.76
Mathematics & Statistics **	45	101	146	9.5
Mechanical Engineering	41	410	451	29.3
Engineering Technology (Assoc.)	0	1	1	0.07
Data Science	13	71	84	5.45
TOTAL	187	1352	1539	100

COMPARED TO	FEMALE	MALE	TOTAL
Total 2019*	207	1273	1480
Total 2018*	216	1310	1526
Total 2017*	205	1397	1602
Total 2016*	221	1431	1652

MASTER OF SCIENCE MAJORS (FALL 2020)	FEMALE	MALE	TOTAL	PERCENT*
Agricultural & Biosystems Engineering	3	4	7	5.31
Civil & Environmental Engineering	3	4	7	5.31
Computer Science	1	3	4	3.04
Data Science	5	32	37	28.04
Electrical Engineering	2	12	14	10.61
Operations Management	1	4	5	3.79
Mathematics & Statistics **	3	10	13	9.85
Mechanical Engineering	3	22	25	18.9
Master of Engineering	4	5	9	6.82
Statistics	2	9	11	8.33
TOTAL	27	105	132	100

COMPARED TO	FEMALE	MALE	TOTAL
Total 2019*	37	128	165
Total 2018*	45	171	216
Total 2017*	64	205	269
Total 2016*	74	194	268

DOCTORAL MAJORS (FALL 2020)	FEMALE	MALE	TOTAL	PERCENT*
Agricultural & Biosystems Engineering	0	8	8	14.29
Civil & Environmental Engineering	2	7	9	16.07
Computational Science & Statistics	4	12	16	28.57
Electrical Engineering	0	20	20	35.72
Mechanical Engineering	0	3	3	5.35
TOTAL	6	50	56	100

COMPARED TO	FEMALE	MALE	TOTAL
Total 2019*	11	47	58
Total 2018*	13	45	58
Total 2017*	14	42	56
Total 2016*	14	42	56

Note: There is some duplication because of students that have more than one program in the same college and totals might not equal 100% due to rounding.

** Includes Math, Math with Data Science Specialization and Math with Teaching Specialization*

DEGREES CONFERRED

	FEMALE	MALE	TOTAL
Agricultural & Biosystems Engineering	1	7	8
Civil & Environmental Engineering	10	26	36
Construction Management	1	19	20
Computer Science	2	27	29
Data Science	1	12	13
Electrical Engineering	3	22	25
Electronics Engineering Technologies	2	16	18
Mathematics & Statistics	15	24	39
Mechanical Engineering	9	85	94
Operations Management	0	13	13
TOTAL	44	251	295

DOCTORAL MAJORS	FEMALE	MALE	TOTAL
Ag & Biosystem/Mechanical Engineering	3	0	3
Computational Science & Statistics	0	1	1
Mechanical Engineering	0	4	4
TOTAL	3	5	8

MASTER OF SCIENCE MAJORS	FEMALE	MALE	TOTAL
Agricultural & Biosystems Engineering	0	1	1
Computer Science	2	5	7
Electrical Engineering	2	7	9
Operations Management	2	0	2
Mechanical Engineering	0	9	9
TOTAL	6	22	28

OTHER STATISTICS

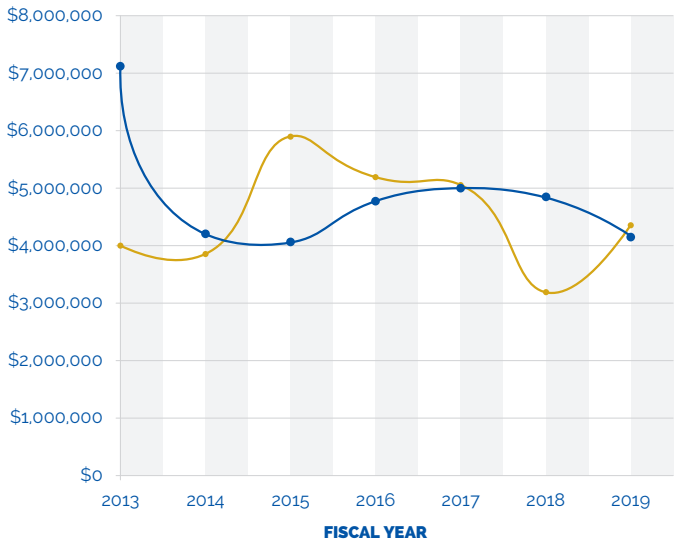
JACKRABBIT GUARANTEE SCHOLARSHIP RECIPIENTS 2019-2020		
First Year	$671,025	234
Second Year	$509,700	185
Third Year	$388,200	133
Fourth Year	$312,100	88
TOTAL:	$1,881,025	640

Average award per year: $2,559

COLLEGE OF ENGINEERING FACILITIES	SQ. FT.
Agricultural Engineering	48,696
Crothers Engineering Hall	89,960
Daktronics Engineering Hall	73,464
Solberg Hall	55,735
Chicoine Architecture, Mathematics & Engineering	62,000
Raven Precision Agriculture Center *(under construction)*	129,000

COMPARISON OF EXTERNAL AWARDS AND EXPENDITURES

FY2013-FY2019



INTERNATIONAL UNDERGRADUATE STUDENTS		PERCENT CHANGE
Fall 2016	230	28.49%
Fall 2017	213	-7.39%
Fall 2018	186	-12.68%
Fall 2019	160	-13.98%
Fall 2020	148	-9.25%

Senior design team members, from left, Dylan McMahon, Gabe Peters, Matt Dentlinger and Sajan Karki examine the prototype drill bit in their setup as part of the next stage of the NASA Moon to Mars Ice & Prospecting Challenge.

TEAM 1 OF 12 CHOSEN BY NASA

SDSU STUDENTS PLOT PLAN TO MELT ICE ON MARS

NASA selected a team from SDSU among its 12 national finalists for its fifth-annual Moon to Mars Ice & Prospecting Challenge.

Senior mechanical engineering students Matt Dentlinger, Arcadia, Iowa; Sajan Karki, Nepal; Dylan McMahon, Watertown; Gabe Peters, Worthing; and their adviser, Todd Letcher, an associate professor in mechanical engineering, developed a plan to extract water from the distant orbs and spent the winter getting it ready for a simulated competition.

The semifinalists receive a $5,000 stipend to fund construction of their system with another $5,000 given to the 10 finalists selected in the spring.

SDSU was the only Midwest school on the list that NASA unveiled Dec. 14, 2020. Among the others tabbed include MIT, Cal Poly-San Luis Obispo, Stevens Institute of Technology and Virginia Tech.

The finalists are tasked with designing, building and testing prototype systems capable of extracting water from ice deposits buried beneath the simulated lunar or Martian soil. They must drill through 2 feet of overburden—rocks, soil and concrete—to frozen tubs of water, melt the ice and then pump out as much filtered water as possible in 12 total hours.

The June 2-4 finals, conducted at Langley Air Force Base in Hampton, Virginia, features competition in hands-off operation and hands-on operation.

In mid-March, teams submitted reports and videos showing the effectiveness of their proposals. On March 3 they gave a virtual presentation of their project to state legislators as part of Undergraduate Research Day at the Legislature.

UNIQUE TOUCH TO A COMMON TECHNIQUE

Letcher said SDSU had not previously entered the NASA contest. “We looked at the history of the competition. It seemed like the same 10 teams were getting into the finals every year. We knew we needed to do something special, something different, to stand out. We did initial testing of our concept and then wrote a proposal.”

The SDSU proposal centers on using the Rodwell Concept, a common technique used in places like Antarctica to melt water for drinking.

The concept calls for drilling a hole, putting a heater in the hole and pumping the water out. “It sounds simple, but it really is complicated,” Letcher said. “How you raise and lower the heater changes the size of the hole. How fast you pump out the water changes the hole.”

What makes the SDSU proposal unique is the heater core design. Letcher said the 3D-printed heater core will have swirling


Matt Dentlinger


Sajan Karki


Dylan McMahon


Gabe Peters


Todd Letcher

holes. The SDSU team will pump the water out and then return the water through the heater core with the water rushing out the swirling holes, thus expanding the size of the hole and increasing the amount of water that is extracted, Letcher explained.

He said it has been proven in small-scale testing. In the coming months, students will see how it works in a large tub—the competition ice block is about 18 inches thick.

WISHING FOR COLD WEATHER

"We were probably the only people in the state that hoped for a cold winter," Letcher said. To prepare, they've filled a large plastic tote with water and stored it outside behind Chicione Architecture, Mathematics and Engineering Hall, he said. Testing of the drilling process will be done separately.

They hoped to combine them during spring break and prove what was proposed actually is a valid concept, Letcher said.

Dentlinger, who did other research work for Letcher in 2019, said, "The project is very appealing because space has always been super interesting to me, especially now that they are trying to establish a base on the moon. This would be a steppingstone for the problems they need to solve to do that."

CAPSTONE PROJECT FOR STUDENTS

Peters said, "Most engineers get their start dreaming about working for NASA, and I saw this an opportunity to fulfill a lifelong goal. Water is incredibly important, especially in space, not just for drinking but also its ability to be split into oxygen and hydrogen, which are able to fuel humans and rockets, respectively.

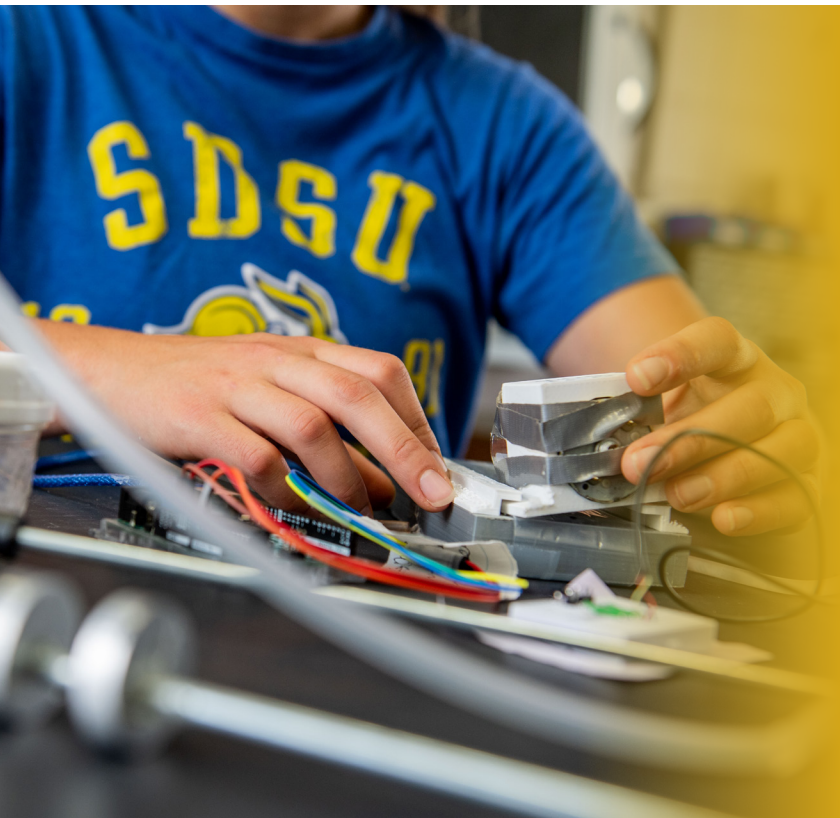
"To have even a small part in achieving this task is incredibly significant especially as we move to exploring space."

NASA has confirmed water on the sunlit surface of the Moon and ice at the poles in addition to extensive subsurface water-ice deposits at mid to high latitudes on Mars. "Being able to harvest and use that water is another feat. This innovation challenge aims to advance critical technologies needed to make it possible," NASA's chief technologist Douglas Terrier said.

The challenge is conducted in cooperation with the National Institute of Aerospace and the Revolutionary Aerospace Systems Concepts – Academic Linkage program.

For the SDSU students, the challenge is the senior capstone project for their major.

Dave Graves



DUAL DEGREE PROGRAM STARTED WITH AUGIE

The Jerome J. Lohr College of Engineering and Augustana University in Sioux Falls agreed upon a dual degree program effective Aug. 31, 2020.

Augustana students must complete at least three years of requirements for a math or physics major and then the student transfers to SDSU to complete the requirements for a civil and environmental engineering or mechanical engineering degree. When completed, the student receives a Bachelor of Arts from Augie and a Bachelor of Science from SDSU.

Students are expected to transfer in a minimum of 58 credits and then take 72 credits over two academic years at SDSU.

Dean Bruce Berdanier said, "These pathways are helpful to the smaller university in recruiting students to start there, but typically would only yield a couple of students per year to our programs as many students choose to stay and finish their degrees at their first university."

POWER, ENERGY SCHOLARSHIP
SELECTIONS AMONG BEST IN U.S.

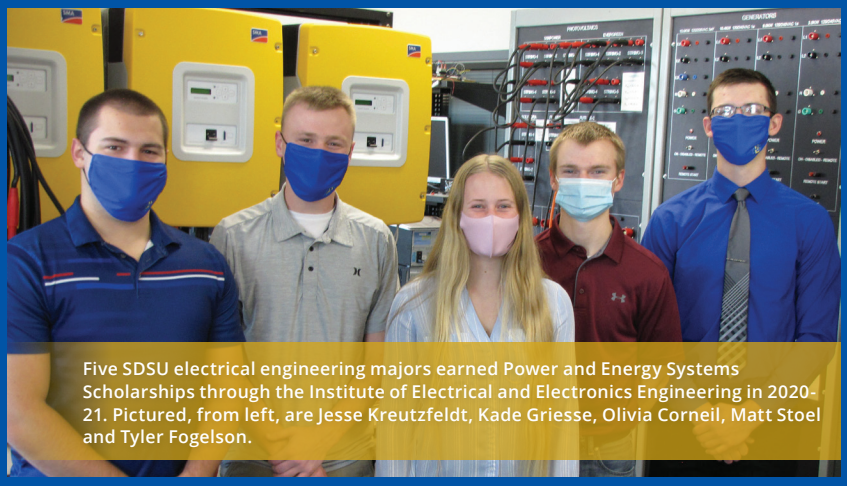
Excellence in educating engineering students in the electric power and energy field continues to be a strong suit for SDSU.

This was highlighted by the performance of SDSU undergraduate students in the prestigious Power and Energy Society Scholarship Program of the Institute of Electrical and Electronics Engineers.

There were five SDSU selections: **JESSE KREUTZFELDT, MATT STOEL, OLIVIA CORNEIL, TYLER FOGELSON** and **KADE GRIESSE.** Kreutzfeldt and Stoel are repeat recipients and received $3,000 scholarships. The others received $2,000 scholarships. All are electrical engineering majors.

The PES Scholarship Program, initiated in 2011-2012, has a mandate to support the most promising future engineers in the power and energy field by recognizing "high-achieving undergraduate students in electrical engineering programs who have committed to exploring the power and energy engineering field through both coursework and career experiences."

The five SDSU selections in 2020-21 are among 118 nationwide from 67 schools. In the 10-state Midwest region, no school had more selections than SDSU. In fact, SDSU tied for second nationwide with five selections. The University of Texas-Austin also had five selections while Arizona State (12) was the national leader.



Five SDSU electrical engineering majors earned Power and Energy Systems Scholarships through the Institute of Electrical and Electronics Engineering in 2020-21. Pictured, from left, are Jesse Kreutzfeldt, Kade Griesse, Olivia Corneil, Matt Stoel and Tyler Fogelson.

Since 2011, SDSU is one of only 12 universities nationwide to have at least one PES Scholar each year. SDSU's 40 scholarships in this program rank second in the region to the University of Illinois-Urbana Champaign's 53. Also, in 2018-19 and 2019-20, SDSU's Grant Metzger and Matt Stoel, respectively, received the Estey Outstanding Scholar Award, which is distributed annually to the top PES Scholar in each of the six IEEE U.S. regions and Canada.

Sid Suryanarayanan, the head of the Department of Electrical Engineering and Computer Science, called the selection results "consistent of the high quality of education we impart in EECS. The current winners, and those from the past, have benefitted largely from the dedicated mentorship efforts of Drs. (Bob) Fourney, (Tim) Hansen, (Steve) Hietpas and (Reinaldo) Tonkoski. Our students' success is one of the best metrics for assessing the impact of our program."

Hietpas, coordinator of the Center for Power Systems Studies, having served on the PES Scholarship committee years ago, knows firsthand the caliber of student applicants from the region's schools.

"For our program to have this many successful applicants is a strong testament to the quality of our students and the strength of our power and energy program at SDSU," Hietpas said.

A PROFILE OF THE SDSU RECIPIENTS:

Kreutzfeldt, a senior from Wentworth, holds a 3.7 GPA and also has received the East River Electric Scholarship. He has interned at Missouri River Energy Services the last two years. Career plans are to stay in South Dakota and work for a power company.

Stoel, a senior from Sioux Falls, holds a 4.0 GPA, is president of the campus chapter of the Institute of Electrical and Electronics Engineers, is involved in the Navigators campus ministry and is a recipient of $2,000 Tau Beta Pi Scholarship for 2020-21.

Stoel has been a substation engineer intern with Ulteig Engineers in Sioux Falls since May 2019 and his senior design project is a Missouri River Energy Services solar garden. Career plans call for him to work as a substation engineer for Ulteig Engineers.

Corneil, a junior from Willmar, Minnesota, holds a 3.77 GPA, is treasurer of the IEEE chapter at SDSU, co-chair of a mentoring program organized by HKN, which is the IEEE honor society; a volunteer with GEMS, an engineering workshop for high school girls; an Angels mentor and a Habitat for Humanity volunteer. She has been selected to the Eta Kappa Nu and Tau Beta Pi honor societies and received 2020-21 scholarships from the Center for Power Systems Studies and Bartels.

Last summer, she had an internship with Willmar Electric Service, and plans another internship at a regional utility or consulting company this summer.

Fogelson, a sophomore from Fairmont, Minnesota, holds a 4.0 GPA and is the electrical team lead for the Lunabotics competition in addition to being involved in IEEE, Tau Beta Pi and HKM peer mentoring.

Griesse, a sophomore from Rock Rapids, Iowa, holds a 4.0 GPA, is the robotics facility manager and vice president of marketing for the Joint Engineering Council. Last summer, he was an intern with DGR Engineering in Rock Rapids.

Dave Grave

CONCRETE TESTING LEADS TO STUDENT OF YEAR HONOR

Participating in research that could change the bridge construction industry, SDSU graduate student Ted Sjurseth has been named the University Transportation Center Outstanding Student of the Year for the Mountain-Plains Transportation Consortium, a university transportation center formed by eight universities stretching from Utah to North Dakota.

He becomes the first SDSU student to receive the honor since 2014 and only the third overall. Chad Stripling received the award in 2009 and Brittney Ahrenstorff in 2014. The Student of the Year Award was presented at a virtual ceremony Jan. 6

Sjurseth, a 4.0 graduate student in civil engineering from Boyd, Minnesota, is working under assistant professor Mostafa Tazarv to research the use of bridge couplers in high-seismic regions. That wouldn't include South Dakota, but because of the Lohr Structures Lab in Crothers Engineering Hall, those conditions can be simulated.

The work focuses on testing seven different types of couplers in seven precast concrete columns in the lab's large capacity hydraulic actuator.

The couplers, formally known as mechanical bar splices, connect sections of rebar within a concrete column. While the couplers can be used in other sections of a bridge column, bridge design codes do not allow the use of the coupler in high-seismic regions at the connection point of the bridge column and footer, Sjurseth explained.

He added there is no practical value to using the bridge couplers at other points if they cannot also be used at the column-footer connection.

BENEFIT: FASTER, LOWER COST CONSTRUCTION

Using couplers in bridge columns could speed the pace of bridge construction because more work could be done at a precast construction plant rather than on-site. Also, higher quality control could be achieved at the precast plant, said Sjurseth, who earned his bachelor's degree in civil engineering in 2019 and carried a 3.91 GPA.

One main reason couplers are not used now is because of the lack of research to ensure their resistance to failure, Sjurseth explained.

"Test data regarding the performance of mechanically spliced bridge columns is scarce and the available data is for columns with different geometries, confinement levels and testing procedures. To better understand the seismic performance of mechanically spliced bridge columns, we are testing large-scale precast columns spliced with different bar couplers.

"Establishing a comprehensive precast column experimental database will allow us to verify or further modify the current design methods and might provide a justification to relax current coupler ban for bridge columns."

TESTING STARTS IN JANUARY

Sjurseth already built and tested a cast-in-place column to provide a comparison standard for the precast columns being built by Gage Brothers Concrete in Sioux Falls.

The half-scale octagonal columns are 9-feet tall with a 24-inch diameter. They will be tested to failure in the lab by mechanically pushing them back and forth with an increasing displacement load to simulate an earthquake, Sjurseth said. Testing one column at a time began the first week of January and wrapped up by early April.

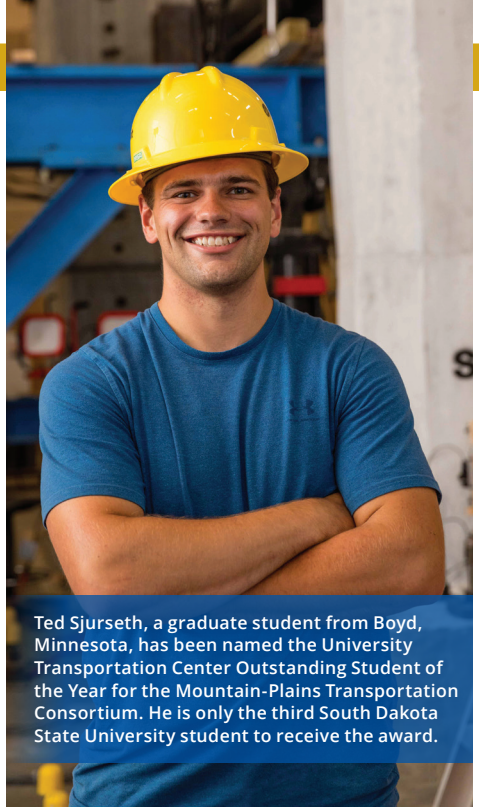
Results will be compiled and then forwarded to the federal highway group that sets design standards for bridges and could become evidence for changing the code.

Sjurseth, who will complete his master's program in May 2021, joined Tazarv in this research because "it has huge implications around the world. The technology could be used anywhere there are earthquakes. California is one of the biggest regions, but also New York, South Carolina, spots in Missouri, areas where they are fracking now, Japan and elsewhere."

Six industry partners from the U.S. and abroad are collaborating in this research project.

TO BEGIN CAREER IN COLORADO

Tazarv, coordinator of the Lohr Structures Lab and an SDSU faculty member since 2015, called the research "the first-of-its-kind comprehensive database of column performance incorporating mechanical bar splices. The results of the study will be used to verify or modify the design of such columns. This research is expected to have national impacts on bridge and precast industries."



Ted Sjurseth, a graduate student from Boyd, Minnesota, has been named the University Transportation Center Outstanding Student of the Year for the Mountain-Plains Transportation Consortium. He is only the third South Dakota State University student to receive the award.

He added that Sjurseth's work has been to design the test setup, the test specimen, construction and testing of eight columns. "The test setup that Ted has designed is a permanent addition to the Lohr Structures Lab as a new modular lateral testing wall. Ted has shown an outstanding performance in this research."

Nadim Wehbe, head of the Department of Civil and Environmental Engineering as well as the Mountain-Plains Consortium, said, "We knew Ted was well positioned for great achievements since his undergraduate years at SDSU. Honoring him with the MPC Outstanding Student award is a testimony to his high standing among his peers and to the quality of our graduate students. I have no doubt that Ted will be as successful in his career as he has been in college."

After graduation, Sjurseth will begin work as a design engineer at the Fort Collins, Colorado, office of Raker Rhodes Engineering, a Des Moines, Iowa-based firm that specializes in building construction, particularly schools, shopping malls and apartment buildings.

Dave Graves

DEAN'S CLUB

FROM JAN. 1 TO DEC. 31, 2020

Dean's Club membership consists of alumni and friends who have contributed $500 or more annually to the Jerome J. Lohr College of Engineering. Dean's Club members are recognized as devoted friends of the college who make a significant impact on the college's future. They also will receive invitations to special college and university functions and updates from the dean.

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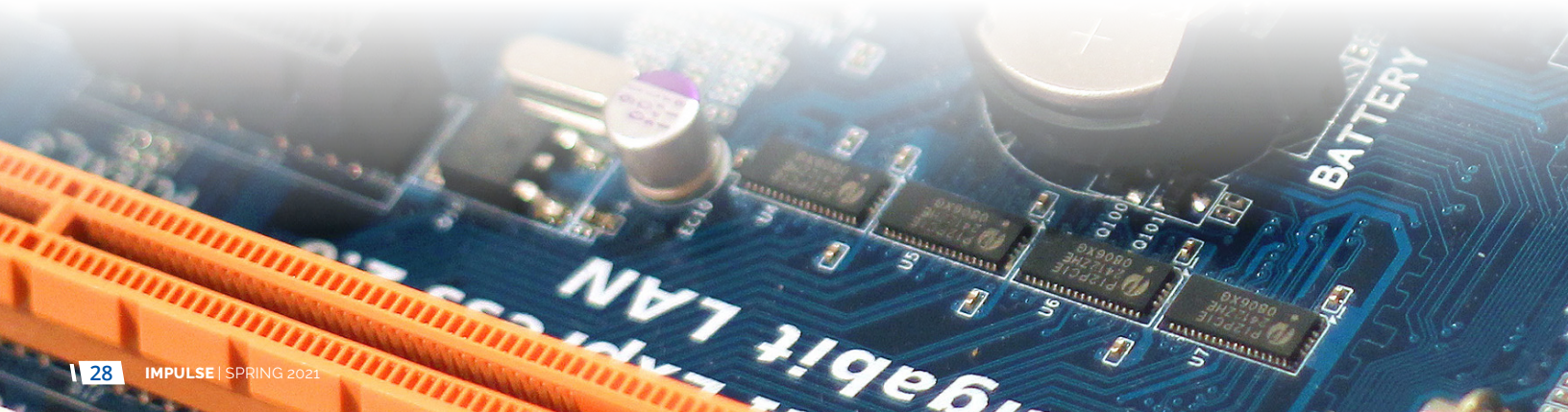

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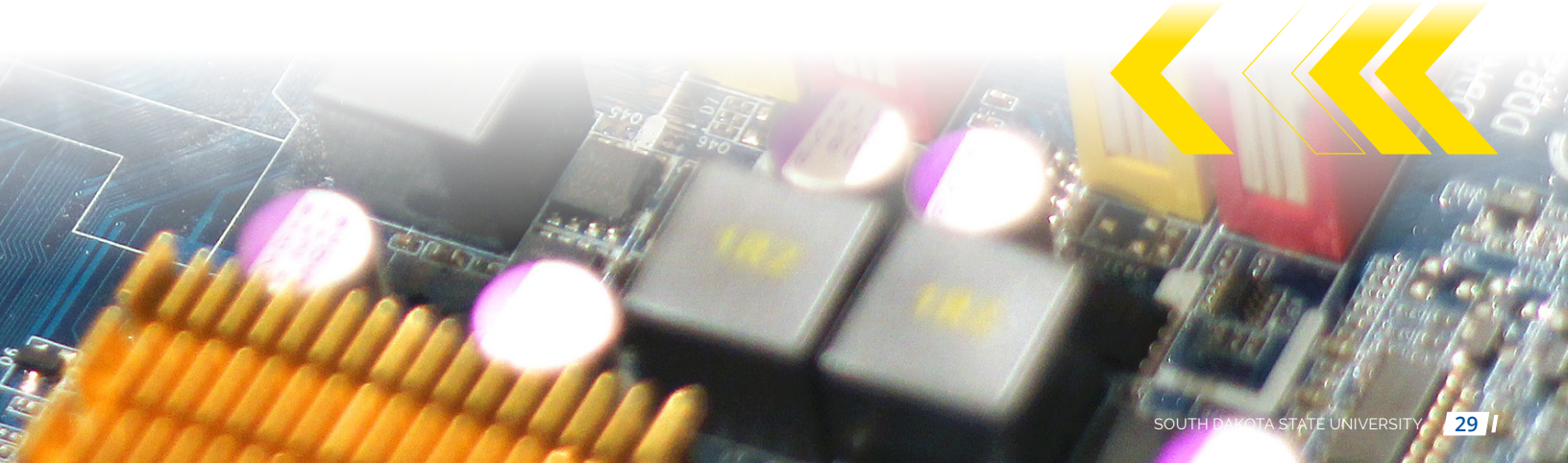
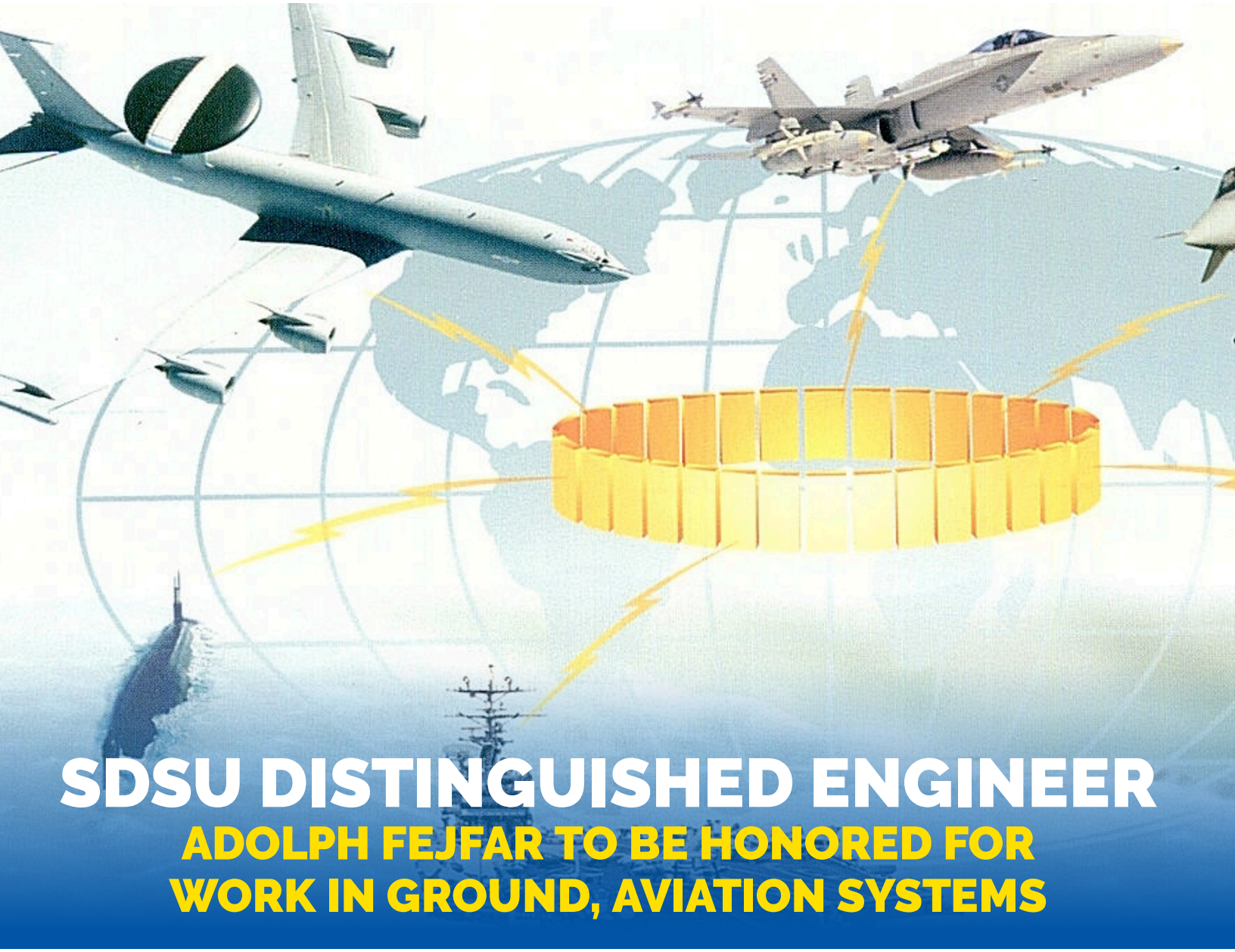




SDSU DISTINGUISHED ENGINEER

ADOLPH FEJFAR TO BE HONORED FOR WORK IN GROUND, AVIATION SYSTEMS

Tabor native Adolph Fejfar (Faye-far) credits legendary SDSU football coach Ralph Ginn and an extended streak of good luck for the prominence he gained in a half-century career in ground and aviation electronics with MITRE Corp.

In April, he became the 143rd person to be honored as an SDSU Distinguished Engineer since then-Dean Junis O. Storrey created the honor in 1977.

(Editor's note: No public ceremony was held because of COVID-19 restrictions. It is hoped to honor 2020-22 recipients next April.)

Col. Michael Dooley, commander of the 96th Cyberspace Test Group at Eglin Air Base in Florida, said, "I can attest to his remarkable lifetime of achievements in the tactical data links field, making significant advancements that directly supported our country's defense ... Adolph Fejfar is a noble public servant who dedicated his life to supporting our country's defense."

Fejfar, 83, and living in Oro City, Arizona, which is near Tucson, fully retired in 2018 after serving at MITRE for 34 years and as a consultant for 18 years. He worked full time with the federally funded research firm from 1966 to 2000 and became the international expert on a synchronous military communication system now used by 48 countries.

Fejfar, the oldest of Bill and Helen Fejfar's nine children, wasn't even planning to attend South Dakota State after graduating in 1955 from Tabor High School, a school of 40 students in a town of 400 people between Yankton and Tyndall in southeastern South Dakota. His plan was to pick up pre-engineering classes at nearby Southern State and then go to the School of Mines.

But that summer Ginn called the Fejfar house and asked Adolph if he would like a scholarship to play football at State. "It took me only a few seconds to accept the offer," said Fejfar.

FULL SCHEDULE AT STATE

At State, he played end all four years, worked as the doorman at the downtown theater and the projectionist for State Photo on campus and graduated in December 1959 with a degree in electrical engineering and a commission in the U.S. Air Force.

After a medical discharge for Type I diabetes and two degrees at Stanford University, Fejfar joined MITRE, a federally funded military research firm.

He worked applied research and system testing of several radio wave propagation projects, including satellite tracking, troposcatter communications and over-the-horizon radars. For 13 years (1987-2000), he was the MITRE site leader responsible for testing the new digital, tactical, synchronous Link 16 communications system.

Link 16 is a complicated and encrypted system that allows communication between military platforms. “When I got involved, there was only the Air Force and the Navy using it. Today, there are 48 countries using it.”

By 2010, Link 16 had become so widespread that international user conferences were held and Fejfar served as a side-session co-chair for several years.

When Fejfar fully retired in 2018, he reflected on the start of his career. “With that initial football scholarship, the world of opportunities opened up for me. My career was my motivation for establishing an endowed scholarship honoring my parents.”

The Bill and Helen Fejfar Endowment provides four $1,000 renewable scholarships to students of any major with preference given to Bon Homme and Yankton county students.

“That was my thank you to the university. I hope that this scholarship will help some high school students pursue their unexpected, fruitful careers,” Fejfar said.

Dave Graves

TIM VANDERHAM

WHEN HARD WORK, PASSION AND A LITTLE BIT OF LUCK INTERSECT

Darold Vanderham had some advice that his son Tim was wise to accept—"use your brain, not your back."

Darold had plenty of experience in the former, working in beef packing, trailer manufacturing and quarry mining, but most especially as a dairy farmer in Union County, South Dakota. Tim, the youngest of Darold and Paulette's three children, loved the farm as well. He began showing the family's black and white and red and white Holsteins at the age of 5.

He was involved in the National FFA Organization at Alcester-Hudson High School and showed cattle with the family at the Minnesota and South Dakota state fairs at summer's end.

But Vanderham, now chief technology officer at NCR in Atlanta, also stood out in the classroom. "I loved math. I loved science." His high school science and math teacher recognized Vanderham's ability as well. At age 14 (1993), he was taking his first computer programming class, learning visual BASIC and Pascal.

"I was pretty fortunate to have a high school teacher (Roy Webster) who invested time and pushed the edge in a small school in South Dakota," said Vanderham, who graduated with a class of 42 in 1997.

Next stop was SDSU, which in 1997 didn't have an accredited computer science program. He majored in mechanical engineering, thinking he might land a job with a military contractor, his thinking influenced by a sister who was career military.

CAREER LAUNCHED AT CAREER FAIR

Fate intervened in October of his sophomore year.

"We were required to go to career fair. As I was talking to companies, I didn't just want to sit in a room and do AutoCAD. I just happened to go to the IBM booth at the end of career fair," Vanderham said.

It proved fortuitous. Kevin Moe, a 1988 State grad in mathematics and computer science, was at the table.

"He was surprised I already had computer programming classes on my resume (from high school). He set up an interview for the next day. Three hours after the interview, he offered an internship," Vanderham said.

Moe said he remembers that day in 1998 "like it was yesterday. He had a presence about him when he entered the room. FFA, Boys State governor, computer programming ... he had a very impressive resume. The next day he showed up for the interview on time and interviewed well.

"This was before cellphones. I had to run over to the union to use the phone. I called my boss and said 'I'm going to hire an intern. You have to trust me on this.' My boss trusted me, and the rest is history."

AN INTERNSHIP BEYOND EXPECTATIONS

Vanderham worked as an IBM intern in Rochester, Minnesota, from January through August 1999.

"I'm still a firm believer if you can take off a full semester, that's the best way for you to know if that is what you like and learn what you can deliver to the company. I was able to work on meaty projects and work with clients. When I came back to do my studies, I worked remote from Brookings out of my apartment," said Vanderham, who was working under Moe.

Vanderham believes in both luck and mentors. "My first lucky break was meeting Kevin." Moe served as one of his many valuable mentors.

Of course, hard workers create their own breaks and as an intern, Vanderham "was contributing a lot, working with customers every day," he said.

'ENDED UP WORKING FOR MY INTERN'

Moe said, "It became very apparent he was a very goal-oriented achiever, quickly performing above expectations. What was amazing, he was only three semesters in. He was helping

Posing in a mechanical engineering lab at SDSU in November 2019 are Kevin Moe, far left, and three recipients of the Kevin Moe Scholarship. Joining Moe are Jonathan Hedman, Tim Vanderham and Todd Letcher, a Lohr College of Engineering faculty member.

customers, which was unheard for interns. He set a goal and he achieved it. He wanted to be the best at what he did. You could just see it. If the customer needed something, it got done. If the customer had problems, he did what it took to get the customer working again.

During his internship he was working with the software "LoadRunner," which at the time was the industry benchmark for load testing and automated testing tools. "I not only did the scripting of the testing but also then helped debug the application and IBM product defects," Vanderham said. He worked with clients who came to the Rochester lab and made a trip to Taipei, Taiwan, to work with a company in its lab.

Moe said Vanderham's trajectory was obvious from the get-go.

"My boss and I knew when he got hired on, Tim was going to excel and move through the company. After one meeting when Tim had left, my boss said we all will probably end up working for him." Sure enough, before Vanderham left IBM, "he recruited me to help him out on a project. I ended up working for my intern," Moe said.

'I JUST FELL IN LOVE WITH IT'

Vanderham said, "In July 2000 (before his junior year), IBM made me a full-time employee with benefits. I was a full-time student plus working 50 to 60 hours per week and traveling. There was some tension at times with the (SDSU) engineering program, but I knew IBM was what I was going to do for my career.

"I just fell in love with it. My management team gave me guidance, mentored me and let me go," he said.

His occupational passion didn't throttle his academic efforts. He graduated with a 3.79 GPA and a degree in mechanical engineering. "I took my finals (May 2002) from San Francisco. Some professors were very supportive. Others were taken aback that I already had my career in place," he recalled.

QUICKLY PROMOTED TO MANAGEMENT

Vanderham began his postgraduate IBM career in Raleigh, North Carolina, IBM's software headquarters. There he focused on his goals, worked hard and found mentors. By April 2004, just 23 months after graduation, he was managing a team of 15 people.

His overall career with IBM would span 18 years, progressively gaining responsibilities, culminating as vice president of development and operations for IBM Cloud Platform Services (Bluemix).

Along the way, he was mentored by a number of strong leaders. Two in particular, Beth Smith and Marie Wieck, really challenged him, helped him spot weaknesses and teach Vanderham the skills he would need to become the leader and senior technology executive that he has become today.

In November 2016, he became chief technology officer in the tax and accounting division of Thomson Reuters in Carrollton, Texas. Vanderham was there 21 months before becoming senior vice president of software and chief technology officer for NCR in Atlanta in July 2018.

NCR CTO: DREAM JOB

Vanderham calls it his dream job because "I'm leading a recognizable software technology company. It's technology that we as consumers use every day. The fact I can see that my team is producing something that is used by hundreds of millions of consumers every day is cool. Point of sale, digital banking ... We process 750 million transactions a day.

"We believe NCR is the largest digital banking platform in the consumer banking market and a global market leader in retail self-checkout and restaurant point of sale. Simply stated, we keep commerce running around the globe."

He noted the COVID-19 pandemic provided opportunity for the $6.5 billion company.

"NCR's strategy is 'simple made possible.' Banks, restaurants and retailers, everyone saw a shift in consumer behavior with the arrival of the pandemic. NCR is at the forefront in those three industries as the digital transformation continues to accelerate.

"We work through Google and Microsoft to enable our customers to, for example, start a transaction on a mobile device but go to a branch to finish the transaction, combining the physical and digital world. We make it possible to digitize our consumer interactions, whether that's scanning a QR code and paying at a restaurant table or contactless payments at a retailer or a gas pump," Vanderham said.

At left, Tim Vanderham shows the fall calf Goldrush during the open class Holstein junior championships at the 2019 South Dakota State Fair. The Union County native began showing cattle at age 5 and continues to show the family's Holsteins at the Minnesota and South Dakota state fairs.

TOP MANAGEMENT REQUIRES DIFFERENT SKILLS

Clearly, Vanderham had the skills to be successful in the hands-on application of technology and "I do miss it a little bit," he admits.

"I knew for a while I could choose either path (management or technology). However, because of the amount of impact I saw I could have on people's careers, I quickly knew my passion was to get into management," Vanderham said.

While chief technology officer and senior vice president for software are lofty titles, Vanderham sees his job description simply: "I'm a dot connector.

"You can't be involved in every conversation. You can't micromanage from my position. I do dot connecting. With an organization of almost 4,000 people, the team in Israel may not be aware of what the team in Atlanta is doing. I'm seeing from a higher level everything that is going on and want to have people in a position so they can succeed. You have to trust your team, trust your organization."

While he has been in upper-level management for several years, he still finds it a challenge to resist the temptation to take over a project.

"It's hard to not be in the middle of something that is critical. You must stay engaged but not too deep ... As a Type A engineer, you always want to be managing the situation, but if I've hired the right people, they will probably do the job better than I would because they're closer to the situation," Vanderham said.

MENTORING NEXT GENERATION

One of those people he has entrusted is Nicholas Wolter, a 2016 computer science graduate who received the Kevin Moe Scholarship in his sophomore year. He started at IBM Raleigh after his junior year, finished his remaining class while there and in early 2019 was recruited by Vanderham to join him at NCR, where he is a front-end architect of NCR Retail.

"I have been very fortunate that Tim decided to help mentor me and allow me to grow my experience far past what I thought was possible at this stage of my career.

"Tim himself is a great inspiration to what someone with an SDSU education, good mentors and a huge passion for impacting technology can accomplish. It has been invaluable to get a chance to learn from his experience and get advice on how to tackle and solve the interesting problems we face at NCR.

"Tim bringing me into NCR has been the biggest and most rewarding challenge I have faced through the innovation he has asked from his teams and myself to the company's transformation to a leader in technology," Wolter said.

VANDERHAM ENDOWED SCHOLARSHIP CREATED

Looking back on his career's rocket ship ride, Vanderham said, "I don't know if I would be here today if not for that first internship at IBM."

After that eight-month internship, he received the first Kevin Moe Scholarship. This spring, the SDSU computer science department will award the first Tim Vanderham Endowed Scholarship, which he finalized in December 2020.

"I want computer science students coming from South Dakota State to know you can realize your dreams. There is great opportunity for those who study and work hard. I hope someday someone else from South Dakota State is in the position I'm in or even greater. I'm thankful to be able to give back to the SDSU computer science community," Vanderham said.

The $3,000 scholarship is tailored to second-year students, preferably from South Dakota, and is renewable through the senior year.

In 2018 and 2019, Vanderham toured the college's new facilities and came away impressed.

"The university is continuing to take the right steps forward. You only do that by getting some of the best students and keeping the best students. It's a life cycle I want to be a part of," he said.

Dave Graves

Tim Vanderham poses with his parents, Darold and Paulette, at Kauffman Stadium following the Kansas City Royals win in Game 1 of the American League Championship Series in 2015. Attending major sporting events is one of Vanderham's recreational pursuits.

SLOSS LATEST TO JOIN DEAN'S ADVISORY COUNCIL

Andrew Sloss, chief economic development director/CEO for Brookings Economic Development Corporation, is the most recent addition to the Dean's Advisory Council, joining Feb. 18.

He joined the corporation in October 2020. BEDC is the marketing engine and single point of contact for companies looking to locate and grow in the Brookings region.

Before taking the CEO position, Sloss was managing director at Baker Tilly, an international public accounting firm. In that role, he provided economic development consulting and site selection services to clients nationwide with a focus on the Texas market. His duties included location analysis assistance and coordinating all aspects related to project planning and implementation, including negotiating incentives for companies looking to locate or expand across the United States.

Prior to working at Baker Tilly, Sloss worked for Merit Advisors, a small oil and gas and renewable energy consulting firm in Houston, providing site selection and economic development consulting services.

He also worked for six years at Ernst & Young in New York and St. Louis as a senior manager in Ernest & Young's Location and Investment Services advisory practice.

Originally from Farmington, Minnesota, Sloss practiced law in the Twin Cities for seven years, primarily providing estate and business planning services to his clients prior to working the last 15 years in economic development.

He holds a bachelor's degree in history from South Dakota State University in 1988, a Juris Doctorate degree from William Mitchell College of Law, St. Paul, Minn., and a master's degree in ministry leadership from Crown College, St. Bonifacius, Minn.

Sloss said, "When not leading BEDC, I enjoy tormenting my wife, Sharlay, and our two kids with dad jokes, watching my beloved (Boston) Red Sox and Minnesota Vikings, golfing, fishing, hunting and mowing my lawn."

Dave Graves

MOE JENSEN JOINS DEAN'S ADVISORY COUNCIL

Brookings native Susan Moe Jensen joined the Dean's Advisory Council in April 2020.

A 1976 civil engineering graduate from SDSU, Moe Jensen spent 36 years as a civil engineer in the private and public sector as well as holding several consulting positions.

While working for consulting engineering firm Pickering Associates in Memphis, Tennessee, Moe Jensen was project manager for several large construction projects including a sludge waste energy recovery facility and a 750kv power transmission line.

When employed by Bolton and Menk in Mankato, Minnesota, she designed small water supply and wastewater treatment plants under the Environmental Protection Agency's construction grants program. Moe Jensen also worked as a design engineer for Power Span (now Valmont Industries, Valley, Nebraska) that manufactured high-strength spun concrete power transmission line poles.

Her public sector work included time as a project management engineer for the city of Sioux Falls, where she managed several large federal, state and local transportation projects. While working for the city she was recruited by the Federal Highway Administration as a highway engineer in Washington, D.C.

While there, she developed and taught courses around the country for the National Highway Institute along with directing numerous national transportation and research studies. She moved to the administration's Kansas Division Office, where she held positions as field area engineer and pavements engineer.

Her final position with the Federal Highway Administration was in St. Paul, Minn., as manager of the Federal Project Planning and Research Team for the state. Moe Jensen directed the 20-year programming of federal transportation projects for Minnesota. She also administered the selection of transportation projects in the state that would receive federal funding. She also supervised the federal transportation research program for Minnesota.

Recently retired, Moe Jensen lives with her husband Vaughn Jensen, a senior executive with Willis Re, a reinsurance broker representing insurance carriers globally. They divide their time between homes in Eden Prairie, Minn., and Lake Poinsett.

Dave Graves

DATA COLLECTION BEFORE DESKTOPS

STATE COLLEGE GRAD, 99, HELPED USHER IN DIGITAL COMPUTERS

World War II was over. Don Weidenbach was back in South Dakota wondering what work he could find with his 1943 engineering degree from State College.

Unbeknownst to him and the rest of the world, the computer revolution was just beginning to germinate in St. Paul, Minnesota. Thanks to fate and a friend, Weidenbach intersected with what was then a secretive operation to benefit the military. For 30 years, he worked at Engineering Research Associates (later Univac) as a pioneering engineer in digital computer hardware.

"I was a hardware person, I never really understood a lot about software," Weidenbach said in a phone interview from his apartment in Edina, Minn.

"I went into storage systems, magnetic storage systems. No one that we knew was doing this other than a couple universities. We were pioneers in it. It was slow work; it was hard work. There was no resource. You had to invent as you went along. You couldn't go look in a book" and you certainly couldn't look it up on the internet.

Weidenbach was working in a large industrial plant in St. Paul's Midway district, where wartime gliders had been built.

Backed with military contracts, Engineering Research Associates started with a mission of continuing the U.S. Navy's code-breaking advances made during World War II. Having gained an electrical engineering degree under Professor William Gamble at State and having three years' experience as a radio communications officer in the Army Signal Corps made him an ideal candidate for the work.

But that was a game plan the Divine had shared with no one.

AN EARLY INTEREST IN ELECTRONICS

Weidenbach was born Oct. 30, 1921, in Heil, North Dakota, but moved when he was six months old to Scotland, South Dakota, where his father was a banker. Weidenbach enjoyed building crystal sets, fixing radios and doing wiring projects in the house. When a friend a year older than him decided to go to South Dakota State for electrical engineering, Weidenbach thought it would be a good idea to follow him.

Of course, he had no idea what kind of job he would seek. "I was pretty ignorant about the whole thing. When I went to school (1939), electrical engineering was a pretty limited field—either power generation or working for factories designing radios or other electrical things."

At college, he remembers having to buckle down to master descriptive geometry, calculus and thermal dynamics. He also played in the ROTC marching band and concert band for four years.

SERVING UNCLE SAM

He was in ROTC for three years. Another year of training would have had him graduating to become an infantry officer. That was a commission Weidenbach thought he could live without. So he signed up to enter radar training in the Army Signal Corps after graduation.

After basic training and Officer Candidate School, the second lieutenant went to communications school and was shipped to the Philippines to become a radio communications officer. He was stationed at Luzon sending communications between bases and around the country.

Don Weidenbach, left, poses with Tom Misa, director of the Charles Babbage Institute at the University of Minnesota, when he donated the collage to the institute. The early 1950s collage shows the various steps in drum manufacturing. Weidenbach is the young man in the center of the collage. It originally hung in the offices of Engineering Research Associates, where he worked.

VJ Day arrived Aug. 14, 1945. But Weidenbach was young, unmarried, without dependents and fairly new in his assignment. He wouldn't be sent back to the States for another year.

When the USS Marine Panther set sail in July 1946, he was on board with Bob Erickson, a University of Minnesota electrical engineering graduate who had befriended him when they were inducted at Fort Snelling, Minn., in 1943. "He suggested we look for electrical engineering jobs in the Twin Cities. I thought the Twin Cities was mostly a flour milling place then, not much for engineering jobs."

A FORTUITOUS OFFICE INQUIRY

But Weidenbach was willing to give it a try. In November 1946 he took the bus from Scotland to Erickson's hometown of Kasson, Minn. From there they went to the Twin Cities.

First stop was Honeywell, where they were told it would be several months before a job opened. They visited a switchboard manufacturer, which "sounded boring," Weidenbach said.

Then a stop at the state employment office tipped them to a brand-new company (Engineering Research Associates) less than a year old that was hiring electrical engineering grads. "They wouldn't tell us much about their classified work," Weidenbach said. "But the mystery intrigued us, and we accepted their job offers."

His initial monthly salary of $215 added up to $2,580 annually, less than $35,000 a year in today's dollars.

"We were the technicians, building prototypes and running tests," he said. Erickson and Weidenbach worked together for 10 years before Erickson joined Control Data.

SPEED TALLY—ONE OF A KIND

Weidenbach was a circuit design engineer for his first decade at Engineering Research Associates until he was appointed a supervising engineer on the Speed Tally computer, "our first effort to build a commercial computer."

The computer, which Weidenbach designed in 1950 with no government money, became his "pride and joy." He quarterbacked a team of technicians and engineers that enabled a mail-order company in Chicago to store its 13,000-item catalog in a drum memory. Keyboard operators could find out how much stock was available, subtracting items that were sold and adding new merchandise when it arrived.

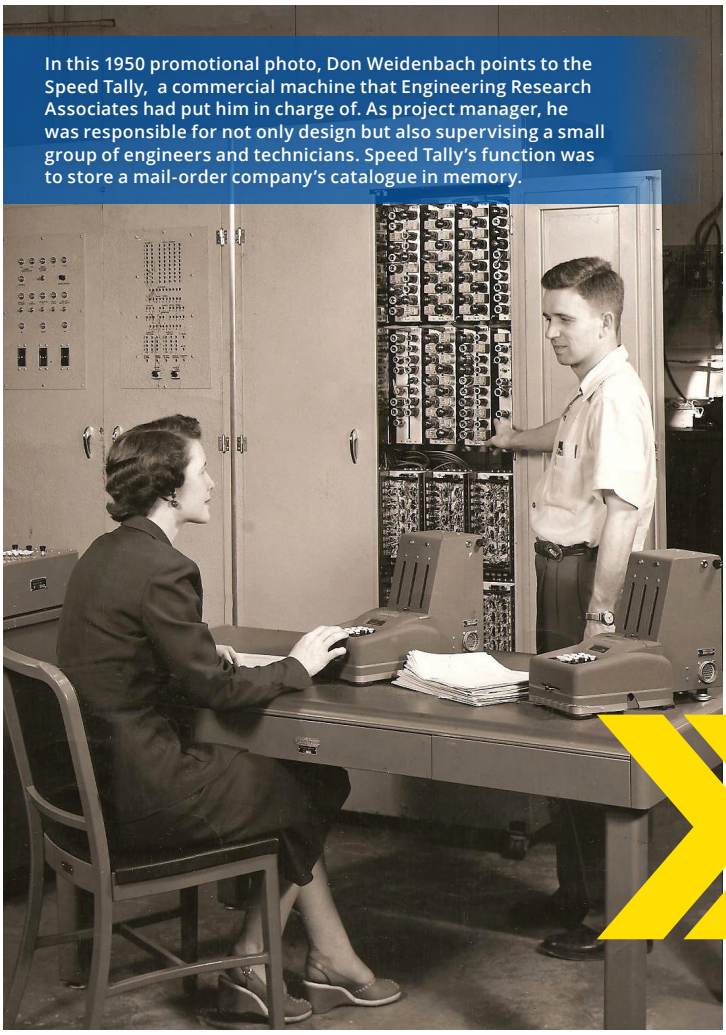
"It sounds ridiculously simple in today's world, but 60 years ago it was on the cutting edge!" Weidenbach wrote in 2012 for the VIP Club, an association of retirees from Univac.

The Speed Tally, a vacuum tube computer, had a half dozen people working on it. Only one machine was built. "If there was a problem, we didn't have a field engineering department so we would send somebody to help them out. Often, it was me. It was built out of military-type hardware, which was expensive," Weidenbach said.

UNIVAC FILE—MASS PRODUCTION

The following commercial program he worked on was the Univac File computer, which had more than 50 engineers working on it. More than 200 of them were produced.

"They were modular so you could fit it with a typewriter and punch card machines. You could fill a big room in no time. It was a huge electronic filing system that kept inventory and could retrieve data. It replaced punch card equipment. The computer was five or six cabinets. Each cabinet was bigger than a piano. The size would double or triple when adding a punch card system and tape equipment," Weidenbach recalled.



In this 1950 promotional photo, Don Weidenbach points to the Speed Tally, a commercial machine that Engineering Research Associates had put him in charge of. As project manager, he was responsible for not only design but also supervising a small group of engineers and technicians. Speed Tally's function was to store a mail-order company's catalogue in memory.

He advanced to department manager and after the Univac File, Weidenbach managed two military programs, both missile control systems.

In 1976, work slowed and he accepted an early retirement option that included health insurance. Within six months, he accepted a friend's offer to become a salesman of wholesale electrical parts in the Twin Cities. "I did that for eight years, and I enjoyed meeting with many former acquaintances."

Top: A prototype lab model of a magnetic storage drum that Weidenbach worked on in the late 1940s for Engineering Research Associates. It has since been donated to the Minnesota History Center in St. Paul as part of its "The Greatest Generation" exhibit. The first unit he worked on had a 34-inch diameter wheel that was driven by an electric motor. Data was recorded on magnetic tape.

Left: Don Weidenbach and Bob Erickson pose during their 1946 job-hunting trip to the Twin Cities. The Navy buddies and electrical engineering graduates both landed jobs at Engineering Research Associates, which had just started to build a digital computer for the military. Weidenbach '43 became an expert in magnetic storage for early computers.

INTRODUCED TO THE PC

He was fresh into that job when he got his first taste of a personal computer. His boss bought an IBM personal computer and said, "'You get the job of getting it to run,'" Weidenbach recalled. He bought his own computer in 1978 but didn't do much with it. "People were playing games and putting recipes on (personal computers). That didn't appeal to me. Later on, I got interested in genealogy and knew that was the way to go."

He has had several since then, using them for genealogy and tracking finances, investments and stocks. "Now I use a cellphone more than anything. I look up a lot on Google, but I have laptop on a chair in living room for word processing and genealogy," he said.

Weidenbach has been a faithful giver to his alma mater, specifically the Jerome J. Lohr College of Engineering, the electrical engineering department and The Pride of the Dakotas Marching Band, and continues to read its publications. He hasn't been back for Hobo Day in 10 years but used to play the baritone horn in the alumni band.

He and his wife, Charleen, had five children, three daughters who went to Concordia College in Minnesota and a son who went to Augsburg. None became engineers, but the daughters did marry engineers. His wife is in failing health, but Weidenbach agrees, "For 99, I'm very good. I have sore joints and I had a quadruple bypass at 95, but I am doing well. I still drive my car."

The formula for his longevity? "Choosing the right parents," he says with a smile. His dad died at age 93.

Dave Graves

DJ BUTHE, '04 civil and environmental engineering, began work March 1 as the first public works director for the City of Brookings.

Since December 2011 he has been director of the Minnehaha County Highway Department. Prior to that he worked 7 ½ years as a project manager with the city of Sioux Falls. His focus included the Sioux Falls Regional Landfill. At SDSU, he was named "most outstanding senior" in the civil and environmental engineering department and was a dean's list student.

The recently approved public works director position oversees the engineering, street and landfill departments.

JAIME SLY, '04 electrical engineering, a member of the industrial advisory board for the electrical engineering department, was among those honored with the Dr. April Brooks Awards for promoting equity in gender and/or sexuality.

Sly is a systems engineer working on critical new technology projects for Collins Aerospace Systems in Burnsville, Minnesota. She works on all pressure and air data products on multiple commercial, military and business platforms. She is also active in multiple STEM outreaches as a volunteer and mentor, participates in industry societies such as Society of Women Engineers and the International Counsel on Systems Engineering, and leads systems engineering initiatives at Collins Aerospace.

She has spoken on multiple industry panels for diversity and inclusion and has mentored high school and college students through various science, technology, engineering and math programs.

The campus awards were presented in March.

LONALD LLOYD AMUNDSON, '58 mechanical engineering, died Jan. 5, 2021, surrounded by family.

Amundson, 84, was born Sept. 21, 1936, at Ward. A 1954 graduate of Flandreau High School, Amundson was hired by IBM, in Rochester, Minnesota, after earning his bachelor's degree. He would work there for 35 years. He and his wife of 63 years, Audrey (Armstrong), lived in Rochester until 2011, when they moved to Eagan, Minnesota, to be closer to children and grandchildren.

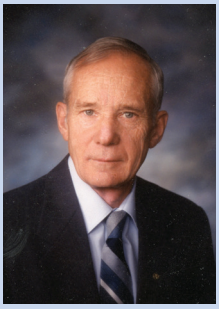
Survivors include his wife, three daughters, Lori (Jim) Rathburn, Lisa Amundson and Stacy (Gary) Crawford; five grandchildren and a sister, Ona Kay Galles.

ROGER DAVIS, '59 ag engineering, died Dec. 5, 2020, surrounded by family.

Davis, 88, of Ankeny, Iowa, was born Nov. 19, 1932, at Bushnell. After graduating from Brookings High School in 1949, he served in the U.S. Navy, married Bonnie Lou Bothwell in 1956 and took classes at State. After graduation, he worked at Minneapolis Moline as a regional sales manager in Alexandria, Minnesota.

In 1964, the family moved to Ankeny, where he founded Davis Equipment Corp., a fertilizer equipment distribution company that continues in operation under the guidance of his grandson.

Memorial gifts can be made to the SDSU Foundation or the No Foot Too Small organization.



ROBERT FODNESS, '47 electrical engineering, died Oct. 6, 2020, at Rapid City.

Fodness, 94, of Rapid City, was born Nov. 4, 1925, in St. Paul, Minnesota, and grew up in Tracy, Minn. He served in the U.S. Navy during World War II. His career was spent as a professional engineer and land surveyor, working principally in the construction of rural electrical and telephone systems.

He joined the U.S. Bureau of Reclamation, Parker Davis Project in Phoenix, as an electrical engineer in 1963. He transferred to the Missouri-Oahe Project Office in Huron in 1973, serving as chief of the power division and later as Huron district manager when the Bureau of Reclamation's electrical power system was transferred to the Department of Energy.

He is survived by his wife of 63 years, Grace; a daughter, Sharon Fodness (Ed Malin); three sons, Keith, Dale and Eric; two daughters-in-law, five grandchildren and five great-grandchildren. He was preceded in death by two sons.

JOHN M. NIELSON, '63 electrical engineering, died August 23, 2020, at his home in Santa Fe, New Mexico.

Nielson, 81, a native of Mitchell, attended public schools in Mitchell, White Lake and Brookings, graduating from Brookings High School in 1957. After graduating from State, he moved his family to Albuquerque, New Mexico, and began his career with Sandia National Laboratories, where he was able to earn a master's degree in electrical engineering from the University of New Mexico in 1965.

The bulk of his professional career was spent with Sandia, where he was involved with test equipment design in both the Albuquerque and Livermore, California, locations. Upon retiring in 1999, he returned to South Dakota and lived on Lake Poinsett where he could fish to his heart's content.

Nielson moved to Santa Fe in 2013 to be close to family. He is survived by his wife of 62 years, Betty; a daughter, Krista; two grandsons, and three great-grandsons, all in Santa Fe.

DAVID WESTBROCK, '64 electrical engineering, died Oct. 1, 2020, at his residence in Madison.

He graduated from high school in Browns Valley, Minnesota, in 1960. While at State, he played football and wrestled. He began his career at Kaiser Aluminum in Spokane, Washington. In 1967, he earned a master's in electrical engineering from the University of Idaho.

He moved to Medford, Oregon, where he worked for Pacific Power and Light repairing hydroelectric generators. He continued to work on generators in Ariel and Vancouver, Wash.

In 1975, he became manager of B-Y Electric Co-op in Tabor and in 1990 became manager of Heartland Consumers Power District in Madison. He retired in 2004. However, he served on the Heartland board until 2020 and also served on several state and federal commissions.

Survivors include his wife of 56 years, Phyllis; two sons, Marc (Samantha) and Matthew; two daughters, Tanya (Steve Youngs) and Laura (Jimmy) Kneedler; five grandchildren and a great-grandson.

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SMARTER GIVING ... YES, IT'S A THING

Being "smart" is something that we all strive for in ourselves and our activities. Webster defines smart as "having a high degree of mental ability." An alternate definition is "using built-in technology to gather and process data for improved operation."

A great number of scientists, engineers and programmers (including alumni of the Jerome J. Lohr College of Engineering) have invested tremendous amounts of time and effort in recent years to create a smarter world. No doubt you are aware of the smart grid, smart highways, smart infrastructure, smart buildings and smart agriculture (better known as precision agriculture at SDSU). In fact, many of you may have spent time developing SMART goals to guide you and your teams to success.

While looking closely at these smart systems, a few common themes arise. The most common theme is using new technologies to create a system with the ability to adapt and evolve to changing conditions. In turn, this will provide improved efficiency and reduced waste.

But wait, what does any of this have to do with giving to support the students and faculty in the Jerome J. Lohr College of Engineering? So many of you have generously given over the years to provide critical support for scholarships, updated facilities and departmental needs. Your generosity has made a big impact on students and faculty and allows them to contribute to building a smarter world. Your support will be critical in enabling the college to meet future needs in these areas.

As mentioned, smart systems "adapt and evolve to changing conditions" and the SDSU Foundation is paying attention to those changing conditions as well. There are several options for making smarter gifts and some options have changed in recent years. These smarter giving options include retirement accounts—IRAs and 401(k)s, stocks, physical assets, business and estate planning. Many of these tools are simple and may create greater impacts and reduce taxes with your philanthropy.

Like any smart system, we all need to gather data and adapt to the new conditions. The SDSU Foundation team is ready to discuss your thoughts on "giving smarter" and helping you impact the future.

Tom Becker '81

SCHOLARSHIPS
AT SOUTH DAKOTA STATE UNIVERSITY

OUR STUDENTS HAVE BOLD DREAMS AND AMBITIONS FOR THEIR FUTURES.

Scholarships change their lives and contribute to their success at SDSU.

For more information on scholarships or to make a contribution, please contact the SDSU Foundation.

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Graduate student Ted Sjurseth '19 is working on testing a new means of connecting bridge girders. He recently was named the University Transportation Center Outstanding Student of the Year for the Mountain-Plains Transportation Consortium. For more on Sjurseth, please turn to page 27.